REPORT TO THE CONGRESS

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

The U.S. Fishing Industry--Present Condition And Future Of Marine Fisheries

The United States, with the fourth largest coastline and the third largest continental shelf in the world, has almost one-fifth of the world's marine fish resources within 200 miles of its coastline. It might be expected that, with the abundance of resources, our fishing industry would be strong and prosperous but this is not the case. Domestic landings of edible fish have remained constant since 1960 and some segments of the harvesting sector are in a chronically depressed state. The demand for fish has increased but U.S. landings have supplied a declining share of the domestic market while imports of edible species have increased sharply to a point where it represents 62 percent of the total demand for edible fish products. This resulted in a fish trade deficit of $1.4 billion in 1974. Opportunities exist to strengthen and expand the U.S. fishing industry by increasing the harvest and the efficiency of harvesting operations and overcoming barriers in processing, marketing, and distributing fish and fish products.

VOLUME I

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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To the President of the Senate and the
Speaker of the House of Representatives

This report discusses our study of the U.S. commercial fishing industry--present condition and future of marine fisheries. We made our study at the joint request of the House Committee on Merchant Marine and Fisheries and the Subcommittee on Fisheries and Wildlife Conservation and the Environment.

Our review was made pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

We are sending copies of this report to the Director, Office of Management and Budget, and to the heads of the departments and agencies responsible for administering fishery-related programs.

Comptroller General
of the United States

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GLOSSARY

Anadromous species	Fish, such as salmon, which spawn in fresh waters, migrate to ocean waters, then return to fresh waters to spawn.
Aquaculture	The raising of aquatic animals under controlled conditions.
Biomass	The total mass or amount of living organisms in a particular area or volume.
Contiguous fisheries zone	A zone contiguous to the territorial sea and located from 3 to 12 miles offshore. The Federal Government has authority to regulate in this zone. There is, however, no clear legal basis to exercise this Federal authority except over species which are subject to international agreement and marine mammals. Each State has authority to enforce regulations against its own citizens in this zone but not against citizens of other States.
Depletion	Reduction of stock size due to overfishing or any other cause induced by man or a natural cause, resulting in substantially reduced yield and requiring a reduction of fishing to enable replenishment of the stock.
Domestic fisheries	Fisheries or portions thereof under U.S. jurisdiction or for species taken entirely or predominantly by U.S. fishermen.
Ecological	Pertaining to the branch of biology that deals with the relations between living organisms and their environment.

Estuary	Areas where freshwater meets saltwater; i.e., bays, mouths of rivers, salt marshes, and lagoons. Estuaries serve as nurseries and spawning and feeding grounds for large groups of marine life.
Excess harvesting capacity	More men, vessels, and gear than necessary to harvest efficiently.
Exvessel price	Price received by fishermen for fish, shellfish, and other aquatic plants and animals landed at the dock.
Fisheries resources	Fish, shellfish, and other forms of aquatic plant or animal life.
Fishery	The act of or place for commercial and recreational fishing, often with reference to a particular season, species, or group of species.
Fishing effort	The activity of catching or harvesting fish, usually measured as a combination of the amount of gear and time used while fishing.
Gear	Fishing equipment of various types, such as nets, lines, and traps.
Landings, commercial	Quantities of fish, shellfish, and other aquatic plants and animals brought to shore and sold.
Mariculture	The raising of aquatic animals in marine waters under controlled conditions.
Maximum sustainable yield	The scientific term describing the balance between catching a certain number of fish of a particular species and leaving the necessary number to allow propagation.

Mesh	One of the openings between the cords of a fishing net.
Optimum sustainable yield	The amount of fish which will provide the greatest overall benefit to the Nation, with particular reference to food production and recreational opportunities, and which is prescribed as such on the basis of the maximum sustainable yield, as modified by any relevant economic, social, or ecological factor.
Otter trawl	A conical net, usually large, towed near the sea bed to catch fish on or near the bottom.
Overfishing	Harvesting fish or shellfish in an amount greater than the maximum sustainable yield.
per capita consumption	Consumption of edible fishery products in the United States, divided by the total civilian population.
Per capita utilization	Utilization of all edible and nonedible fishery products in the United States divided by the total population of the United States.
Purse seine	A flat net, fitted with floats on top and weights on the bottom, fitted with a purse line in the bottom so that the bottom can be closed after the net has encircled a school of fish.
Recreational fishing	Fishing for pleasure, amusement, relaxation, or home consumption. If part or all of the catch is sold, the monetary returns constitute an insignificant part of the person's income.

Stock	A type or species of fish capable of managing as a unit.
Territorial sea	A zone from the coastline to 3 miles offshore. This zone is regulated by individual States with each having jurisdiction over fish resources within its coastal boundaries. In some States, cities and towns have jurisdiction over some fisheries within their coastal boundaries.
Underutilized species	Fish species in waters off the U.S. coast not used commercially at all or only partially used by U.S. fishermen.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

THE U.S. COMMERCIAL FISHING INDUSTRY--PRESENT CONDITION AND FUTURE OF MARINE FISHERIES

D I G E S T

This report deals with U.S. commercial fishing in the oceans--95 percent of all U.S. fish landings--and problems of the industry.

On November 19, 1975, the Chairmen and Ranking Minority Members of the House Committee on Merchant Marine and Fisheries and the Subcommittee on Fisheries and Wildlife Conservation and the Environment asked GAO to make a study to see what could be done to revitalize the U.S. commercial fishing industry exclusive of aquaculture (fish farming). (See app. I.)

The House Committee on Merchant Marine and Fisheries plans to use this report in formulating legislation for the development and use of fish and shellfish resources and a national fisheries policy. Where applicable, GAO proposes solutions to problems which must be resolved to revitalize this industry.

At the direction of the Chairman, House Subcommittee on Fisheries and Wildlife Conservation and the Environment, GAO did not obtain formal comments from the agencies having fishery-related programs. However, it did discuss these matters with the National Marine Fisheries Service, Department of Commerce.

Because the Office of Technology Assessment was making a study on the

--technology of U.S. fish harvesting techniques, gear and vessels, and processing fish onboard vessels and in onshore facilities, and

--enforcement of U.S. fishing rights under the new 200-mile economic zone off this country's coasts,

GAO reviewed these matters on a limited basis.

A separate GAO report will be issued on Great Lakes fishing.

FISHERY CONSERVATION AND MANAGEMENT ACT OF 1976

This act (Public Law 94-265) provides a framework and opportunities as of March 1, 1977, to assist the U.S. fishing industry by providing for

--conserving and managing fish resources,

--supporting and encouraging the implementation and enforcement of international fishing agreements,

--promoting domestic and recreational fishing under sound conservation principles,

--preparing and implementing fishing management plans,

--establishing regional fishery management councils,

--encouraging the development of fisheries not sufficiently developed or not developed at all, and

--establishing procedures to permit fishing by other nations in the U.S. 200-mile economic zone.

The act makes many changes--steps in the right direction--but their effectiveness will depend on how they are carried out.

Because it will not be effective until March 1, GAO cannot assess the impact of the act. GAO suggests solutions to problems which will (1) strengthen the Federal role in assisting the

industry now and (2) remain even after the act takes effect.

FEDERAL INVOLVEMENT IN MARINE FISHING

Twelve Federal departments and agencies conduct or support fishery-related programs. In 1973 8 of them supported 1,449 marine research projects on living systems (other than human beings). Twenty States, several regional commissions, and a number of private institutions, including universities, also supported research in this area.

GAO could not determine the extent of funds devoted to fisheries research because information was not available on the total funds from all sources. The National Marine Fisheries Service, the agency principally concerned with marine fishing, obligated $44.5 million for fiscal year 1976. (See pp. 51 and 52.)

CHARACTERISTICS OF THE INDUSTRY

Numerous individual, usually small, industries, such as the lobster, salmon, shrimp, and tuna fisheries, comprise the U.S. commercial fishing industry. Methods of harvesting, processing, and distribution are different for each.

Fish are common property. Anyone desiring to fish can do so. This contrasts with most other natural resources, in which access is limited. Fishing is more of a hunting than a cultivating activity, a high risk, and sometimes, a dangerous operation which is seasonal in nature.

Fish are a renewable but limited resource affected by natural or man-induced environmental changes, including too much fishing in specific areas.

THE ISSUES

The United States has almost one-fifth of the world's marine fish resources within 200-miles of its coastlines. It might be expected that, with such an abundance of resources, the U.S. fishing industry would be strong and prosperous. This is not so.

In addition to expanding aquaculture (not included in this study) the industry can be strengthened by

--restoring fish stocks through effective management and improvement of the environment,

--developing underutilized species, and

--displacing foreign fishing off the U.S. coasts. (See pp. 63 to 82.)

In 1974 fishermen from other countries caught 6.2 billion pounds of fish within 200 miles of the U.S. coasts. (See app. V.) With the 200-mile wide jurisdiction provided by Public Law 94-265, U.S. fishermen will have a preferential right to fish in this area previously fished by ships of other nations.

Because certain species are overfished, restricting the U.S. harvest for these species may be necessary now and could require a moratorium until the stocks are restored naturally to a level that will assure perpetuation.

In addition, some fisheries can be strengthened by increasing the efficiency of their harvesting operations and by overcoming barriers in processing, marketing, and distributing fish and fish products. (See pp. 92 to 105.)

What are the issues?

Common property

Often too many fishermen, vessels, and gear concentrate in "harvesting" a particular species which may result in overfishing. When this happens, harvesting costs of fishermen increase and their efficiency decreases. More fishermen often means less catch for each.

To conserve fish resources, States have enacted regulations which generally give little consideration to fishermen's economic efficiency. As the economic viability of fishermen becomes impaired, obtaining financing at reasonable rates of interest and with reasonable loan payback periods becomes more difficult for them. (See pp. 83 to 86.)

Solution

The solution is to limit fishing, facilitating management efforts to conserve fish while increasing the efficiency of fishermen, improving the expected rate of return on investments, and encouraging the development of underused species. This might be done by

--limiting the number of fishing licenses to be issued,

--establishing fees based on volume or value of fish landed,

--establishing quotas on the volume of fish landed,

--establishing a program to buy back those vessels, made idle by actions taken by Government entities to reduce fishing effort, as an inducement to reduce the number of vessels in overcrowded fisheries, and for possible resale of the vessels for use in other fisheries, and

--combining two or more of the above.

Limiting commercial fishing effort will result in social and economic problems for those fishermen who are displaced. Before limiting fishing, consideration must be given to the interests of both commercial and recreational fishermen when they compete for the same resource.

The Fishery Conservation and Management Act authorizes regional fishery management councils to establish limited access schemes.

Fragmented jurisdiction

Fishing off the U.S. coasts is carried on in three ocean zones:

--Territorial sea (0 to 3 miles off the coastline).

--Contiguous zone (3 to 12 miles offshore).

--High seas or international waters, extending beyond 12 miles.

Under the 1976 act the contiguous zone will be extended from 12 to 200 miles offshore, effective March 1.

Generally, individual States have jurisdiction over the territorial sea bordering their coastlines which, in some instances, have been delegated to cities, towns, or counties. In the other zones a State may enforce regulations against its own citizens but not those of other States.

The Federal Government has jurisdiction over the contiguous zone and U.S. vessels operating on the high seas. However, except for marine mammals, endangered species, and species covered by international agreements, clear authority to manage U.S. fishing activity in these zones had not been assigned to a specific Federal agency.

Fisheries on the high seas are open to all nations. In some instances, certain fisheries are managed through international agreements, but membership in such agreements is voluntary and compliance is difficult to enforce.

Fisheries management is difficult when only one government entity is involved but becomes more difficult when several government entities are involved, particularly when States, cities, towns, and counties desire to protect local interests and political concerns.

The State-Federal Fisheries Management Program is a voluntary effort on the part of States and the National Marine Fisheries Service and provides a means for resolving problems created by inconsistent State laws, but progress has been slow.

Public Law 94-265 provides a framework for overcoming the adverse effects of fragmented jurisdiction by assigning the responsibility to manage species harvested predominantly outside the territorial sea to regional fishery management councils and the Secretary of Commerce. Many fisheries, however, are harvested predominantly within the territorial sea and will remain under State jurisdiction. This appears to be a basic shortcoming in Public Law 94-265, because certain important species which span, or migrate between State boundaries, or beyond the territorial sea might be excluded from comprehensive and coordinated management--a must, if fish resources are to be sustained. (See pp. 86 and 87.)

Possible solution

Public Law 94-265 could be amended to expand the Government's authority to include species of fish which are harvested predominantly within the territorial sea but span or migrate between States or beyond the territorial sea for which States have not voluntarily implemented effective management plans within a reasonable time.

Lack of precise data

Biological, social, and economic data are needed to make fishery management decisions. Biological data is concerned with the status of the fish stocks, their life cycles, and the effects of fishing and environmental changes on them. Although some knowledge exists on the conditions of stocks and the interdependence of various species, scientific proof of fishery conditions has not been available. As a result, fisheries managers have been reluctant to make hard management decisions. Additionally, social and economic data necessary to measure the probable effect of a management decision on fishermen and the local economy often is lacking.

Public Law 94-265 requires the regional fishery management councils to establish and maintain scientific and statistical committees to assist in developing, collecting, and evaluating data. It also requires the Secretary of Commerce to begin and maintain a comprehensive program of fisheries research. GAO cannot prejudge the adequacy or effectiveness of the future efforts--this will be contingent upon the available resources and effort expended. (See pp. 87 to 88.)

Possible solution

The Government could take the initiative to insure that States, universities, and industry cooperate in developing the techniques required to collect and analyze data on the relationships between fishery resources and their environment and on the socioeconomic effects of the manner in which they are used.

In negotiating with other countries wishing to fish in the U.S. 200-mile zone, the Government should require those countries to cooperate in developing, collecting, and evaluating scientific and statistical data.

Environmental problems

Fish are sensitive to their environment. Pollution and alteration or destruction of coastal and marine areas can adversely affect fisheries by making fish unfit for human consumption, interferring with their reproduction, or destroying them.

The overall economic loss attributable to adverse environmental conditions cannot be estimated but numerous individual instances have shown that substantial losses occur. The enactment of Federal laws concerned with pollution are steps in the right direction but much needs to be done. (See pp. 89 to 91.)

Possible solutions

Possible solutions are:

--*Enforcing the several Federal laws concerned with pollution.*

--*Increasing the cooperation and coordination of participating Federal, State, interstate, and local agencies.*

--*Conducting additional or expanded research needed to keep the short and long term effects of pollution as low as possible.*

Fragmented industry

Most fishermen are small independent fishing vessel operators--more than 90 percent of them employ less than five people. The fish processors and distributors are also principally small businessmen.

A fragmented industry makes accumulating capital and achieving coordination among operators to develop fisheries extremely difficult. Industrywide cooperation toward exploiting development opportunities could help overcome existing barriers. (See pp. 104 and 105.)

Possible solution

A possible solution to alleviate the problems caused by fragmentation is through expanded use by industry of cooperatives and joint ventures. The Government should explore the Federal assistance (technical and financial, for example) needed by the industry on a short term or temporary basis to create an environment in which industry can operate with little or no Federal assistance. GAO believes that existing authority available under the various programs of Federal organizations, such as Small Business Administration and National Marine Fisheries Service should be utilized to the extent that they can meet these needs.

Jurisdictional actions taken by foreign countries

The actions taken, or to be taken, by foreign governments to extend their jurisdictions over their fishery resources have adversely affected or will adversely affect certain segments of our fishing industry. The shrimp and tuna fisheries, for example, will be harmed unless the other nations extending their jurisdictional authority permit U.S. vessels to fish in their waters. (See pp. 99 to 101.)

Because our fishing industry cannot control the actions of foreign governments and yet suffers the consequences of those actions, the Government should assist the industry. If foreign governments take actions adversely affecting the U.S. fishing industry, the Government should, as authorized by Public Law 94-265

--Enter into reciprocity agreements with foreign countries fishing in the U.S. 200-mile zone.

--Deny other governments the right of access to U.S. waters for fishing purposes.

--Impose import prohibitions on fish and fish products of other governments concerned.

Possible solutions

Should this prove to be unsuccessful, the Government might consider the following solutions.

--Encouraging displaced fishermen to transfer to domestic fisheries having growth potential and to fully use existing Government programs for financial and technical assistance needed.

--Providing employment-retraining assistance to displaced fishermen so they may move into new jobs.

--Establishing a program to buy back idle vessels of displaced fishermen.

Costs associated with harvesting

The fishing industry is subject to high costs for vessels, nets and netting, and insurance. U.S. fishing vessels cost up to 30 percent more than foreign-built vessels. At the present time, U.S. fishermen do not have the option to purchase vessels from U.S. or foreign shipyards because, pursuant to law, they cannot register foreign-built vessels in the United States. As a result, if they want to land fish in U.S. ports, it must be in U.S.-built vessels. The terms of loans to fishermen usually include high interest rates and short loan repayment periods, which may cause cash flow problems for vessel owners. One or two poor fishing seasons can ruin a fisherman financially. (See p. 102.)

Import duties on fishing nets and netting used in making nets can be as high as 50 percent. This discourages the use of foreign nets and netting and helps keep the cost of domestic nets high. (See p. 103.)

Because fishing is hazardous, the cost of hull, protection and indemnity insurance average

5 to 7 percent of a fishing vessel's operating cost, excluding depreciation. (See p. 103.)

Possible solutions

Possible solutions are to:

--*Allow U.S. fishermen to use foreign-built vessels to land fish in domestic ports. This must be weighed against the effect such an action might have on the domestic shipbuilding industry and national interests.*

--*Explore possibilities for more favorable loan interest and repayment schedules. This should be a joint effort by the Government, fishermen, and banks.*

--*Lower the tariffs on nets and netting material.*

--*Explore the possibilities for lowering insurance rates.*

Development of underutilized species

Some fish resources available to the U.S. fishing industry are considerably greater than amounts presently harvested by U.S. and foreign fishermen. Species such as croaker, mullet, and anchovy are not fished to any great extent by domestic or foreign fishermen. Species such as Pacific hake and pollock, fished intensely by foreign nations, are not sought by U.S. fishermen. Before most underused species can be marketed commercially, barriers to their use must be overcome. The fragmented structure of the industry and its common property concept, limit the availability of capital for fisheries development. In addition to dealing with these problems, development programs would have to overcome barriers in areas such as resource assessment, harvesting technology, handling and transportation, product development, processing technology, and marketing and economic analysis.

Public Law 94-265 encourages the development of fisheries which are underused or not used by U.S. fishermen. How should this be done?

Joint Federal and industry sponsored development projects, directed at overcoming major barriers to the use of a specific underutilized species or related group of species, would effectively develop those fisheries.

This approach has several advantages:

--Because its scope is limited, the effort is more manageable and, therefore, more likely to succeed.

--Resources can be concentrated and coordinated where needed.

--The problems, and the solutions, affecting one species may be different from other species.

--Cost-benefit relationships can be measured.

Possible solutions

To induce industry participation, the Government could:

--Develop a management program to conserve the resource after the fishery has been developed.

--Establish property rights, such as a guaranteed share of the annual quota for fishermen who pioneer the development of underutilized resources.

--Encourage the use of existing Federal financial assistance programs now available to fishermen and processors where private capital is not available. The financial programs should be utilized to the extent that they can meet the needs of fishermen and processors.

Other areas where assistance might be warranted

Certain established fisheries may find it hard to expand or to remain viable because of problems in other areas. For example:

--Efficient harvesting techniques and gear are available in some individual fisheries (salmon, oysters) but their use is sometimes restricted by State regulations. (See p. 93.)

--In the tuna, shrimp, and clam fisheries, innovative harvesting techniques and gear need to be developed and used. (See p. 94.)

--In several fisheries (oyster, crab, Atlantic groundfish) processing improvements are needed, that is, mechanization to replace manual labor. (See p. 96.)

--In the oyster, herring, and crab fisheries, maintaining the quality of fresh fish and processed products is a problem. (See p. 97.)

--The Atlantic groundfish, Pacific groundfish, herring, oyster, shrimp, and clam fisheries are facing marketing and distribution problems. (See p. 98.)

--Competition from imported fish products hampers the Pacific coast oyster and the blue crab fisheries. (See p. 101.)

--In several fisheries (crabs, shrimp, oyster, snapper/grouper) there are labor supply problems. (See p. 103.)

Possible solutions

Some Federal assistance seems warranted if the industry is to remain viable and expand. For example, the Government could undertake research and development programs to deal with technological problems. Before doing so, if at all, a

congressional and/or an administration policy decision should be made on the amount of Federal effort and resources to be used.

But Congress and/or the administration will have to determine whether Federal assistance should be furnished to the industry where

--a single firm as opposed to the fishing industry or major segments of the industry benefits, or

--a project is too costly when compared to possible benefits, or

--a problem is common to many industries and Government assistance is furnished to none.

WORK DONE

Major areas considered in GAO's study included

--fish as a food resource,

--fish as an economic resource,

--environmental problems,

--the role of the U.S. fishing industry,

--marine recreational fishing,

--the fishing industry in other nations,

--Federal involvement in fisheries,

--status of major fish stocks and opportunities for expanding the U.S. harvest,

--major difficulties in managing fisheries, and

--barriers to industry expansion and/or viability.

Many Federal laws greatly affect the fishing industry and are administered by several departments and agenices. GAO prepared a compilation and analysis of the laws to identify improvements possible through reorganization, recodification, clarification, and amendment. (See app. II.)

GAO studied the harvesting, processing, and marketing of the more important fish species which accounted for over 80 percent of the volume and about 90 percent of the value of the 1974 harvest. In addition, GAO studied the potential for developing underutilized fish resources. (See app. III.)

The fishing industry in other nations--Canada, Denmark, Japan, Mexico, Soviet Union, United Kingdom, and West Germany--was studied to ascertain how these countries assisted their fishing industries and to provide a basis to formulate alternatives to assist the U.S. fishing industry. (See app. IV.)

A statistical comparison of the U.S. and foreign catch of fish off the U.S. coast was prepared which shows, by species, the potential for increasing the U.S. harvest by limiting or excluding foreign nation fishing in the U.S. 200-mile zone. (See app. V.) GAO contracted with the Institute for Marine Studies, University of Washington, to examine the effect of extended fishery jurisdiction by the United States on international fisheries conventions and agreements. (See app. VI.)

During the study, GAO met with and obtained the views of Federal, international, State, and local government officials and representatives of the fishing industry, associations, cooperatives, and unions.

GAO coordinated its efforts with the following organizations conducting fishery studies:

--Office of Technology Assessment, United States Congress.

--Congressional Research Service, Library of Congress.

--Atlantic States Marine Fisheries Commission, Gulf States Marine Fisheries Commission, and Pacific Marine Fisheries Commission.

CHAPTER 1

ORIGIN OF STUDY AND PLAN OF REVIEW

On November 19, 1975, the Chairmen and ranking minority members of the House Committee on Merchant Marine and Fisheries and the Subcommittee on Fisheries and Wildlife Conservation and the Environment requested us to make a study to delineate policy issues, options, and costs of revitalizing the U.S. commercial fishing industry. (See app. I.) The study was to serve two broad functions.

--Provide an objective analysis of a number of areas where present programs may be inadequate or non-cost-effective, or where additional programs are needed.

--Clarify the roles of Government and the private sector in the structuring and functioning of the various sectors of what is collectively referred to as the American fishing industry.

The Committee intended to use our study in formulating comprehensive legislation for the development and utilization of fish and shellfish resources and a national fisheries policy. Members of the Committee and the Subcommittee believed that serious consideration should be given to what measures might be taken to revitalize the industry. The members felt that ample opportunities exist for strengthening the industry, but they remain to be translated into specific requirements for future industry and Government action. Aquaculture was not to be included in the study because it would be the subject of separate consideration by the Committee.

OTHER EXPRESSIONS OF CONGRESSIONAL CONCERN FOR THE FISHING INDUSTRY

In the last 20 years congressional concern has been expressed regarding the development and strengthening of the U.S. fishing industry.

The Fish and Wildlife Act of 1956 (Public Law 84-1024) recognized that U.S. fish resources made a material contribution to the national economy and food supply and that such resources were a living, renewable form of wealth capable of being maintained and greatly increased with proper management. The Congress declared that the act's provisions be administered to stimulate the development of a strong, prosperous fishing industry.

The Marine Resources and Engineering Development Act of 1966 (Public Law 89-454) established a national policy which recognized the need to rehabilitate U.S. commercial fisheries.

Senate Concurrent Resolution 11, adopted by both Houses of the Congress in December 1973, declared that it was the policy of the Congress that all necessary support be provided to strengthen and protect the sagging U.S. fishing industry.

In February 1974 the Senate adopted Senate Resolution 222, authorizing a national ocean policy study. Among other things, the study aims to (1) establish policies to achieve full utilization and conservation of living ocean resources and (2) recommend solutions to problems in marine fisheries and their management, rehabilitation of U.S. fisheries, and future international negotiations on fisheries.

The Fishery Conservation and Management Act of 1976 (Public Law 94-265) recognizes that

> "A national program for the conservation and management of the fishery resources of the United States is necessary to prevent overfishing, to rebuild overfished stocks, to insure conservation, and to realize the full potential of the Nation's fishery resources."

Specifically, the act established a fishery conservation zone which extends seaward from the States' 3-mile territorial sea out to 200 miles and provides the United States with exclusive fishery management authority over all

--fish within the fishery conservation zone;

--anadromous species throughout the migratory range of each such species beyond the fishery conservation zone, except during the time they are found within any foreign nation's territorial sea or fishery conservation zone (or the equivalent) to the extent that such sea or zone is recognized by the United States; and

--continental shelf fishery resources beyond the fishery conservation zone.

In addition, the act recognizes that U.S. fishermen have a preferential right to marine resources within the U.S. fishery conservation zone. Public Law 94-265 is to take effect March 1, 1977.

PLAN OF OUR REVIEW

Major areas considered in our study include

--fish as a food resource,

--the role of the U.S. fishing industry,

--marine recreational fishing,

--the industry in other nations,

--Federal involvement in fisheries,

--status of major fish stocks and opportunities for expanding the U.S. harvest,

--major difficulties in managing fisheries,

--barriers to industry expansion and/or viability,

--fish as an economic resource, and

--analysis of fisheries legislation.

We included in our study the harvesting, processing and marketing aspects of the more important fish species which accounted for over 80 percent of the volume and about 90 percent of the value of the 1974 harvest. In addition, we considered the potential for developing underutilized fish resources.

In performing the study, we held discussions with representatives of the National Marine Fisheries Service (NMFS), a part of the National Oceanic and Atmospheric Administration; the Economic Development Administration, Department of Commerce; the Coast Guard, Department of Transportation; the Fish and Wildlife Service, Department of the Interior; the Forest Service and the Farmers' Home Administration, Department of Agriculture; the Food and Drug Administration, Department of Health, Education, and Welfare; the Department of State; the Environmental Protection Agency; the National Science Foundation; and the Small Business Administration. We met with representatives of various State agencies; institutions of higher education; fishing associations, cooperatives, unions, commissions, and institutes; and fishing businesses. In addition, we visited selected foreign countries and obtained information from government, association, cooperative, and industry representatives and observed fishing operations in those countries. We also discussed worldwide fishing matters

with representativesw of the Food and Agriculture Organization of the United Nations (FAO) in Rome, Italy, and the Organization for Economic Cooperation and Development (OECD) in Paris, France.

We reviewed literature on fishing activities and problems and analyzed legislation pertaining to fisheries.

We contracted with the Institute for Marine Studies of the University of Washington to examine the international implications of a 200-mile economic zone. Specifically, the Institute was to assess the effects of extended fishery jurisdiction by the United States on international fisheries commissions and bilateral and multilateral international fisheries agreements, examine the expected impact of the zone on foreign fishing within the 200-mile limit of the United States, and assess the status and effectiveness of present U.S. fisheries conventions and bilateral and multilateral agreements and the likely changes when the extended jurisdiction is adopted by the United States. (See app. VI.)

COORDINATION WITH OTHER GROUPS CONDUCTING FISHERY STUDIES

During the course of our study, several other groups were concurrently conducting fishery studies.

These groups were the:

1. Office of Technology Assessment of the U.S. Congress.

2. Congressional Research Service of the Library of Congress.

3. Atlantic States Marine Fisheries Commission, Gulf States Marine Fisheries Commission, and Pacific Marine Fisheries Commission.

Our activities were discussed and coordinated with the efforts of these groups.

CHAPTER 2

FISH AS A FOOD RESOURCE

Over the past centuries man has become less of a hunter and more of a cultivator. Instead of relying on the fortunes of chance to provide food, he has become responsible for growing his own. In the ocean, however, man is still largely a hunter--a highly skilled hunter providing food for millions of people but finding it increasingly difficult to provide additional food. The supply of fish is approaching an upper limit where commonly used species and conventional technologies can no longer provide additional supply.

At current demand rates, the worldwide supply of popular species of fish will likely reach its upper limit within 20 years. This limit is biologically determined and additional fish could not be caught without endangering the perpetuation of fish resources. In this respect, the supply factor for fish is somewhat different than for other foodstuffs where biological limits are recognized as existing but are not imminent.

Even though limited as a food source in comparison with other types of food--providing about 5 percent of world protein needs and about 1 percent of world calorie needs--fish are a prime or important secondary source of highly nutritious protein in several areas of the world.

NUTRIENT VALUE

For man to survive he has to ingest six basic nutrients: proteins, carbohydrates, fats, minerals, vitamins, and water. These nutrients in turn perform three basic functions: supply energy, provide structural material to the body, and regulate certain bodily functions.

The nutrient value of fish lies primarily as a protein resource. Proteins are a primary building substance of the body and are required for the syntheses of all enzymes, antibodies, and some hormones. Insufficient protein, normally associated with insufficient calorie intake, is the primary root cause for much of the world's nutritional inadequacies.

Fish have a higher proportion of polyunsaturated fats compared to other meats, an important health consideration in maintaining a low cholesterol diet. They are also a good source of some minerals and trace elements.

Proteins are synthesized within the body from amino acids or are ingested from plant and animal proteins which in turn are broken down into amino acids within the body and restructured. Protein formation can only take place when all the necessary amino acids are simultaneously in place and in the proper portions. Of the 21 amino acids needed by man to synthesize protein, 8 (referred to as essential amino acids) cannot be synthesized within the body and must be provided from animal or plant sources. Fish have significant quantities of the essential amino acids needed by man and a higher protein efficiency ratio than milk, soybeans, beef, and peanuts.

CONSUMPTION

In 1974, of about 154 billion pounds of the world commercial catch of fish, crustaceans, mollusks, and other aquatic plants and animals (except whales and seals), about 108 billion pounds (70 percent) was used for human consumption. Most of the remaining 30 percent was reduced to animal feed for swine and poultry.

Although the world commercial catch has fluctuated over the past few years, its use for human consumption has been increasing every year, as shown below.

	Pounds		
	World commercial catch	Disposition	
		Human consumption	Other use
	(000,000,000 omitted)		
1969	138.2	88.6	49.6
1970	154.3	95.9	58.4
1971	154.8	98.5	56.3
1972	144.6	99.6	45.0
1973	145.7	104.7	41.0
1974	153.9	107.6	46.3

While U.S. per capita utilization (edible and industrial uses) of commercially caught fish has fluctuated over the past 10 years and decreased significantly from the late 1960s to 1974, U.S. per capita consumption (edible only) has remained relatively constant. This is depicted in the following table.

	Pounds	
	Per capita utilization	Per capita consumption
1965	54.2	10.8
1966	63.5	11.0
1967	70.5	10.6
1968	86.9	11.0
1969	58.4	11.2
1970	56.2	11.9
1971	56.9	11.5
1972	66.1	12.6
1973	49.4	13.0
1974	46.5	12.1

World per capita consumption of fish is about 24 pounds yearly, ranging from less than 1 pound in Afghanistan to over 79 pounds in Japan and Iceland.

DEMAND

As with any other foodstuff, demand for fish is influenced by rising population and increasing affluence. Population growth obviously creates demand simply by increasing the number of people to be fed. Affluence can affect demand in two ways--ability to purchase needed food or desire for a more varied diet.

The Food and Agriculture Organization (FAO) projects that the demand for fish is expected to grow 3.4 percent yearly through 1990; as shown below, this is higher than the projected demand rates for most other food types.

Poultry	4.1%
Mutton and lamb	3.6
Fish	3.4
Beef	3.0
Pulses, nuts and oilseeds	2.8
Pork	2.7
Vegetables	2.6
Cereals	2.3
Milk	2.2

FAO also projects that the world demand for fish will be about 208 billion pounds by 1985--113 billion pounds for the developing countries and 95 billion pounds for the developed countries. This is about 54 billion pounds greater--a 35-percent increase--than the 1974 world commercial catch.

SUPPLY

The primary factor affecting supply is the ability of the oceans to biologically support the reproduction of fish. Other factors influencing the supply of fish are capital, labor, technology, and government policies.

FAO estimates that the combined maximum sustainable yield (MSY) for popular species of fish is about 236 billion pounds yearly. (A more realistic estimate of potential fish supply is the optimum sustainable yield (OSY) which has not been determined but is considered lower than the MSY).

Assuming that the FAO projections for increasing demands and its MSY estimates are realistic, by 1990 the total worldwide demand for fish will exceed the available supply of popular commercially caught species (exclusive of those produced by aquaculture).

FUTURE POSSIBILITIES FOR ENHANCING THE ROLE OF FISH

Despite the future supply limitations, the role of fish as a food source can be enhanced by

--reducing the percent of fish used for industrial purposes by upgrading the fish for human consumption,

--reducing waste,

--increasing the catch of underutilized and unutilized species, and

--increasing the use of aquaculture.

Approximately 30 percent of the volume of the world catch and 75 percent of the U.S. catch is ground into fishmeal for poultry and swine feed. Over 20 million people could meet all of their calorie needs and far exceed their protein needs if the fish was used for human consumption. It is not likely, in the near future, that fish used in the production of fishmeal will be used for human consumption. In the developed nations, generally dietary variety available from poultry and swine is more desirable than the comparatively unpalatable species of fish used for industrial purposes. To upgrade use of species now being ground into fishmeal, the following would have to occur:

1. Consumers would have to be willing to eat more fish and less poultry and swine.

2. The feeding of poultry and swine would have to be changed to

a. foraging for food or

b. substituting the fishmeal content of feed with other products.

The amount of fish wasted is uncertain and, of course, all waste cannot be eliminated. FAO estimates that about 6 to 8 billion pounds of trash fish is discarded from shrimp boats and 2 billion pounds is lost in trawling for flounder, cod, haddock, and hake. Although some of this fish could be ground into fishmeal, this is unlikely because the fish being thrown away compete for space on fishing boats with the more desirable, higher priced fish. In addition, fish is wasted at processing plants. At some future point, however, this resource could be made use of.

Increasing the catch of underutilized and unutilized species could also augment world fish supply. (See ch. 7.)

Aquaculture already plays an important role in meeting world demand for fish. Some 13 billion pounds, almost 10 percent of the world commercial catch, results from aquaculture.

Aquaculture has been practiced for centuries but only recently has its potential as a world food provider become known. Japan now relies heavily on its finfish and shellfish aquaculture programs. According to a National Marine Fisheries Service planning document, the 1973 U.S. aquaculture harvest was about 178 million pounds and was projected to increase to 1.2 billion pounds by 1990, as shown below.

	Pounds	
	1973	1990
	(000 omitted)	
Salmon	61,000	245,000
Oysters	20,000	200,000
Catfish	48,000	120,000
Trout (freshwater)	30,000	70,000
Shrimp	500	63,000
Crawfish	10,000	30,000
Clams	2,600	25,000
Mussels	-	25,000
Lobster	-	10,000
Trout (seawater)	-	10,000
Abalone	-	5,000
Scallops	-	5,000
Pompano	-	3,000
Other	5,500	400,000
Total	177,600	1,211,000

The potential for increased aquaculture production is enormous. As agricultural production has been increased by domesticating plants and animals and applying new technology and farming techniques, so can seafood production be increased. The potential protein production per unit area of water has been estimated to be up to 5,000 timés that of a similar area of pasture used for beef production. An opinion appearing in a FAO 1974 publication stated that a world aquaculture supply of 110 billion pounds could be achieved by the year 2000, provided necessary research and development measures were undertaken.

CHAPTER 3

PROFILE OF THE

U.S. COMMERICAL FISHING INDUSTRY

In 1956 the United States ranked as the second largest fishing country in the world. By 1974, however, it had dropped to fifth behind Japan, the Union of Soviet Socialist Republics (Soviet Union), the People's Republic of China (China Mainland), and Peru. Together, these five countries caught about 74.5 billion pounds, or a little less than half the world total of about 154 billion pounds of fish, crustaceans, mollusks, and other aquatic plants and animals (except whales and seals). The U.S. catch was slightly less than 4 percent of the world catch.

The following table shows the ranking of the five leading fishing nations in 1956 and 1974.

Nation	1956		1974		Percent change
	Pounds	Rank	Pounds	Rank	
	(000,000 omitted)		(000,000 omitted)		
Japan	10,522	1	23,750	1	+125.7
United States	6,574	2	a/6,049	5	-8.0
China (Mainland)	5,838	3	15,168	3	+159.8
Soviet Union	5,767	4	20,362	2	+253.1
Norway	4,822	5	-	-	-
Peru	-	-	9,149	4	-

a/Includes weight of clam, oyster, scallop, and other mollusk shells.

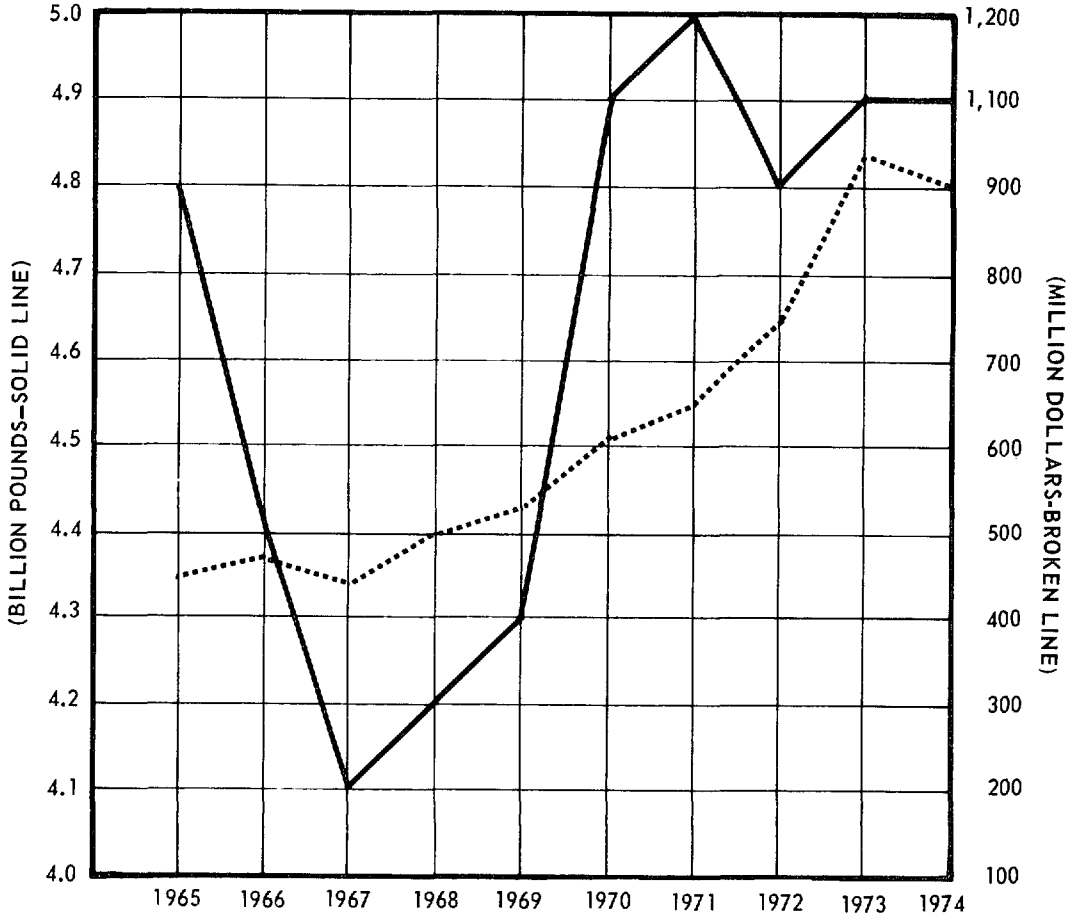
LANDINGS

In 1974 U.S. commercial landings of fish and shellfish were about 4.9 billion pounds--exclusive of the weight of clam, oyster, scallop, and other mollusk shells--having a value of about $900 million to fishermen. The species shown below accounted for about 83 percent of the value and about 74 percent of the volume of the 1974 U.S. landings.

Species	Value	Pounds
	(millions)	
Shrimp	$177.9	369.6
Salmon	121.3	196.8
Tuna	117.8	386.2
Crabs	83.1	329.3
Menhaden	66.4	1,979.1
Lobsters	57.7	41.1
Clams	39.0	119.9
Flounders	34.1	155.9
Oysters	33.6	44.9
Scallops	13.4	9.2

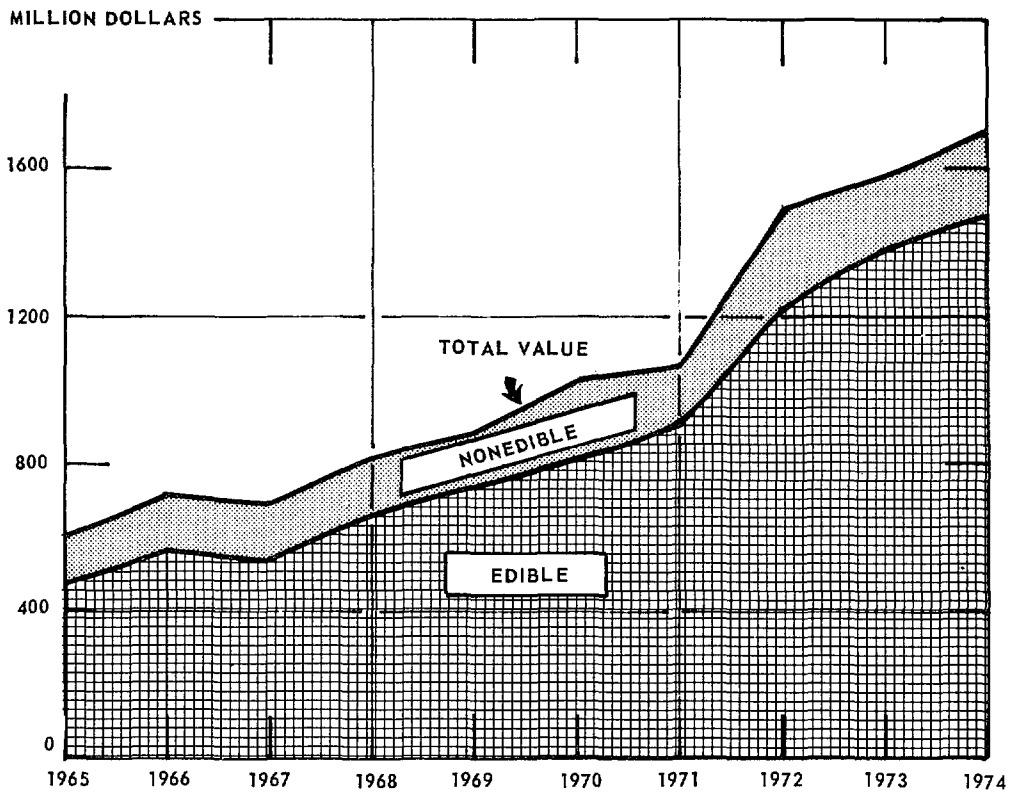
Of the total U.S. landings, approximately 80 percent is finfish and 20 percent shellfish, but finfish account for only a little over half the total value.

Landings of finfish and shellfish have fluctuated rather widely over the last 10 years, while the value of the landings has progressed upward as shown below.



IMPORTS

As shown in the following graph, the value of U.S. imports of edible and nonedible fish and fish products has increased substantially over the last 10 years, from $601 million in 1965 to almost $1.7 billion in 1974.



The volume of edible fishery products imported increased from 1.4 billion pounds in 1965, to a record of 2.4 billion pounds in 1973, down to 2.2 billion pounds in 1974. The types of edible products imported in 1974 were:

Product	Pounds	Value
	(millions)	
Fresh and frozen:		
Shrimp	228.9	$ 387.3
Tuna	789.4	216.1
Fillets	315.2	210.0
Lobsters	55.3	178.2
Blocks and slabs	266.1	141.2
Scallops	18.1	28.1
Salmon	12.5	14.0
Halibut	5.4	5.2
	1,690.9	1,180.1
Canned:		
Tuna	52.7	51.1
Sardines	69.1	36.9
Salmon	8.6	11.9
Oysters	16.0	10.1
Lobsters	1.7	8.6
Crabs	2.4	5.2
	150.5	123.8
Other	370.6	173.9
Total	2,212.0	$1,477.8

About 76 percent of the quantity of edible imports--80 percent of the value--were in fresh and frozen form. Sixty-two percent of the quantity and 55 percent of the value of edible fish and fish products imported in 1974 came from the following five nations:

	Pounds	Value
	(millions)	
Japan	675.5	$295.9
Canada	428.2	233.2
Mexico	104.4	169.8
Iceland	94.9	70.2
Norway	68.3	50.1

The amount of nonedible fish products imported has fluctuated significantly, as indicated below.

Year	Scrap and meal	Solubles	Other	Total
		(000 omitted)		
1971	$38,253	$28	$148,850	$187,131
1972	51,627	36	209,440	261,103
1973	14,286	80	170,283	184,649
1974	15,706	9	199,783	215,498

The National Marine Fisheries Service obtains this data from the U.S. Customs Service, Department of the Treasury, and does not maintain detailed records on the composition of the other category above. The substantial decrease in the scrap and meal category was due principally to the disappearance of the Peruvian anchovetta.

EXPORTS

The value of U.S. exports of edible and nonedible fish and fish products has more than tripled over the last 10 years, increasing from $69.5 million in 1965 to $262.1 million in 1974. Comparing 1974 exports with 1974 imports of almost $1.7 billion shows a U.S. trade deficit of about $1.4 billion.

Although there have been marked fluctuations in the annual volume of edible products exported, there has been a substantial increase from the 96.4 million pounds in 1965, to a record of 238.9 million pounds in 1973, down to 178 million pounds in 1974.

Approximately 54 percent of the amount of U.S. exports of edible products for 1974 is made up of the following types of products.

Product	Pounds	Value
	(millions)	
Fresh and frozen:		
Salmon	28.1	$ 34.9
King crab	2.5	6.3
Shrimp	27.7	47.3
	58.3	88.5
Canned:		
Salmon	8.3	13.3
Sardines	1.7	1.1
King crab	4.6	4.6
Shrimp	6.9	11.8
Squid	8.2	1.7
	29.7	32.5
Cured	8.3	16.5
Total	96.3	$139.5

Sixty-one percent of the quantity and 65 percent of the value of edible fish and fish products exported in 1974 went to the following five nations.

	Pounds	Value
	(millions)	
Canada	39.9	$39.9
Japan	30.6	50.0
Mexico	12.7	15.7
United Kingdom	12.6	18.7
Republic of Korea	12.3	3.2

The value of the U.S. nonedible exports in 1974 was about $62 million consisting principally of:

	Pound	Value
	(millions)	
Fish oils	199	$39.6
Fishmeal	111	16.8
Seal furs	(a)	5.7

a/81,000 seal furs.

Almost 67 percent of the value of the 1974 nonedible exports went to the Netherlands (45.1 percent) and to West Germany (21.7 percent).

EMPLOYMENT

There were about 240,000 employees in the fishing industry in 1974. According to NMFS, about 169,000 were employed as commercial fishermen. About half of the fishermen participated on a full-time basis; that is, 50 percent or more of the working year was spent in commercial fishing activities. The remaining were employed on a part-time basis.

In each of the following 7 States, there were over 10,000 full-time and part-time fishermen.

Alaska	20,768
Maine	17,801
California	14,358
Maryland	14,250
Louisiana	13,550
Florida	11,950
Washington	10,851

Together, these States accounted for 61 percent of the total number of fishermen employed.

NMFS 1974 statistics show that for processing and wholesaling the average yearly employment was 61,114 and 9,636, respectively. For the average seasonal employment the figures were somewhat higher--80,666 and 11,452, respectively.

The following table shows the 1974 average yearly employment by major areas of the country.

Area	Processing	Wholesaling
New England	7,772	1,193
Middle Atlantic	4,216	1,935
Chesapeake	6,685	739
South Atlantic	4,782	881
Gulf	9,316	1,785
Pacific	17,721	846
Great Lakes	1,469	715
Mississippi River	975	1,341
Other	8,178	201

VESSELS AND BOATS

NMFS estimated that 85,872 U.S. boats and vessels engaged in fishing in 1974.

	Number	Pounds
		(000,000 omitted)
Boats (under 5 net tons)	71,365	a/980
Vessels (5 net tons and over)	14,507	3,920
Total	85,872	4,900

a/Includes shore landings of fish and shellfish harvested with nets and gear only.

According to the U.S. Coast Guard 1974 registry of fishing vessels, the average age of the vessels was about 21.6 years. The average age by geographic location was:

	Average age (years)
Atlantic (excluding Florida)	23.4
Gulf (including Florida and Puerto Rico)	16.1
Pacific (including Alaska and Hawaii)	24.6

The size of fishing vessels, measured by gross registered tonnage, were:

Tons	Percent of total vessels
5 to 9	20.8
10 to 19	33.0
20 to 29	11.3
30 to 49	12.1
50 to 99	14.3
100 to 499	7.8
Over 500	.7

Over 3,800 vessels were added to the fishing fleet during the period 1971-74. As shown in the table below, with the exception of 1973 additions, over half of the vessels added were in the 5 to 29 gross tonnage class which are relatively small vessels.

	Total	5 to 29 ton class	Percent to total
1971	1,016	690	68
1972	1,155	724	63
1973	773	370	48
1974	864	503	58

PROCESSING AND WHOLESALE ESTABLISHMENTS

NMFS reported that in 1974 there were 3,534 processing and wholesale establishments in the United States--1,738 processing and 1,796 wholesale. The largest number of processing establishments (477) were in the Pacific States, while the largest number of wholesale establishments (382) were in the Gulf States.

Alaska had the largest number (239) of processing plants, followed by Florida, Virginia, Massachusetts, and Louisiana. As for wholesale establishments, Florida had the largest number (230), followed by New York, Maine, and North Carolina.

The few fish-processing companies that may be considered as "giants" are quite small when compared with the large companies in other areas of food processing. The following percentage analysis of annual sales of fish-processing companies is based on NMFS-furnished information.

Annual sales	Percent
Under $100,000	42
Between $100,000 and $1,000,000	41
Over $1,000,000	17

Only 2.4 percent (43 plants) had annual sales of over $10,000,000.

COOPERATIVES

In 1974 there were 102 fishery cooperatives in the United States, Puerto Rico, and Virgin Islands, which perform the following functions.

Marketing and purchasing	27
Marketing exclusively	39
Collective bargaining exclusively	4
Purchasing exclusively	1
Marketing, purchasing, bargaining	11
Other	20

Alaska had the largest number of cooperatives (37), followed by California and Maine, with 14 and 13, respectively. These three States account for more than 60 percent of the total number of cooperatives. According to NMFS, reliable information was not available on the number of members and fishing crafts represented by the cooperatives because over half the Alaska cooperatives and some of the other cooperatives did not report this information to NMFS.

CHAPTER 4

MARINE RECREATIONAL FISHING

According to a 1970 survey and a projection of a 1974 data collection effort, millions of people participated in marine recreational fishing. Current information is not available on the extent of its contribution to the economy and food supply. Expanded research and more information is needed to improve the management of recreational fishing and to resolve longstanding conflicts between it and commercial fishing interests.

The Federal role concerning marine recreational fishing is carried out principally by the National Marine Fisheries Service which, among other things, gathers data on marine recreational fishing and performs economic analyses of its impact. NMFS has suggested a number of actions to improve marine recreational fishing opportunities and to resolve conflicts between it and commercial fishermen.

Public Law 94-265 expands the Federal role in fisheries management and creates a mechanism for limiting differences among State policies and for resolving marine recreational and commercial fishing disputes.

NUMBER OF RECREATIONAL FISHERMEN

Because only a few States require a marine fishing license, there is no complete list of recreational fishermen. Through 1970, surveys by the U.S. Bureau of the Census to determine the number of persons engaged in saltwater fishing had been conducted at 5-year intervals. According to the 1970 survey, there were 9.4 million saltwater sports fishermen--more than twice the number estimated for 1955.

To obtain updated and additional information on the number of marine recreational fishermen, NMFS collected national data in 1974. A pilot survey was made in Northeastern United States to determine the number of persons engaged in marine recreational fishing between mid-1973 and mid-1974. Although it covered essentially the same area covered by a part of the 1970 national survey, the results varied considerably.

The NMFS pilot survey estimated that 10.9 million anglers fished from Maine through Virginia between 1973 and 1974 compared with the 3.4 million who fished from Maine to Cape Hatteras, North Carolina, in 1970. By projecting the pilot survey results, NMFS estimates that there are about 30 million marine recreational fishermen in the United States.

The major differences between the two surveys were the:

1. 1970 survey included only persons 12 years of age or older, while the pilot survey included all ages.

2. Pilot survey included all persons who fished at least once during the year while the 1970 survey restricted the sample to those who fished at least 3 days or spent at least $7.50 on the sport during 1970.

3. 1970 survey considered only finfishing while the pilot survey included those who fished for both finfish and shellfish.

CONTRIBUTION TO THE ECONOMY

Current information is not available on the economic contribution of marine recreational fishing; however, in 1970 the value of the recreational finfish catch, based on the exvessel prices paid to fishermen would have been about $244 million. This amount is slightly higher than the amount paid to commercial fishermen for edible finfish during 1970. The retail value of the recreational finfish catch would have been $754 million.

Recreational fishing also has a substantial impact on the commercial activities dependent on it. In 1970 anglers reportedly spent an estimated $1.2 billion participating in marine recreational fishing. NMFS estimates that related economic benefits would increase the total to $2.7 billion. NMFS points out, however, that little is known about the dimensions of commercial activities dependent on recreational fishermen. These commercial activities include selling boats, renting fishing tackle, and other activities offering direct service to fishermen.

Although few economic surveys have been made of the commercial activities dependent on recreational fishing, available evidence suggests that the impact is substantial. A 1973 study performed for NMFS reported that there were more than 1 million privately owned boats and about 2,500 commercial recreational fishing boats in the United States. The latter had a gross annual revenue of about $86 million. A 1972 study on the California sport and commercial fishing industries indicated that the net economic value of recreational fishing in California (a leading commercial fishing State) was well over four times that of the commercial fishing industry.

NMFS believes that studies are needed to determine the economic contributions of marine recreational fishermen and suggests that an improved means be developed for monitoring and evaluating the economic impact of recreational fishing.

CONTRIBUTION TO THE FOOD SUPPLY

In 1970, the most recent year for which information is available, marine recreational fishermen caught 1.6 billion pounds of edible finfish, the equivalent of one-third of that year's total commercial catch of edible finfish and shellfish and fish used for industrial purposes. The 1970 recreational catch of edible finfish, however, was about equivalent to the commercial edible finfish catch.

Information was not available as to what portion of the recreational catch was actually consumed. A NMFS official told us that he believes about 90 percent is consumed while a spokesman for the Sport Fishing Institute believes virtually all of the catch is consumed.

The 1970 recreational fishing survey showed that the most commonly caught species, by weight, were bluefish, spotted seatrout, and striped bass. The following table lists the species that accounted for about 42 percent of the recreational catch.

Species	Weight
	(million pounds)
Bluefish	120.8
Spotted seatrout	106.4
Striped bass	83.8
Croakers	75.4
Catfishes	72.5
Atlantic mackerel	70.7
Red drum	66.5
King mackerel	62.6
Total	658.7

As a source of food, the 1970 recreational catch taken on the Atlantic coast (918 million pounds) was greater than the combined catch taken off the coasts of the Gulf of Mexico (486 million pounds) and the Pacific (174 million pounds). Between 1960 and 1970 the weight of the catch increased on both the Atlantic and gulf coasts but decreased on the Pacific coast. Nationwide, the recreational catch increased by 14 percent between 1960 and 1970. However, the number of fishermen has been increasing at a greater rate

than the catch and the average number of pounds caught by fishermen declined by 25 percent between 1960 and 1970.

CONFLICTS WITH COMMERCIAL FISHING

Because marine recreational fishermen compete with commercial fishermen for limited resources, recreational fishing has contributed to the reduction of certain stocks in some areas and there have been longstanding disputes between the two groups. In some cases, species fished both recreationally and commercially are in imminent danger of being depleted in certain areas. These include spotted seatrout, striped bass, rockfishes, bluefin tuna, and winter flounder.

Disputes between recreational and commercial fishermen involve a variety of issues, including access to fishing areas and types of fishing gear used. In the disputes, recreational fishermen often prevail; State governments have closed fishing areas to commercial fishing vessels, restricted the species which may be fished commercially, limited the fishing season for commercial fishing, and imposed more restrictive fishing regulations on commercial fishermen than on recreational fishermen.

An example of disputes between recreational and commercial fishermen is the northern or California anchovy which are found in large schools, generally within 100 miles of the shore. They inhabit the waters from British Columbia to Baja, California. In the United States, anchovy that are harvested are used principally in the production of fishmeal. Sport fishermen use small quantities of live anchovy for bait.

A 1969 estimate of the total northern California anchovy population was about 11 billion pounds. In 1974 the anchovy subpopulation off the coast of southern California was estimated at between 5 and 6 billion pounds. The U.S. commercial harvest for the season ended May 1974 was 242 million pounds.

Marine biologists generally agree that the anchovy could sustain an annual harvest of 50 percent of its population without endangering the maximum sustainable yield of the resource. NMFS biologists believe that a substantially increased anchovy harvest would have little impact on sport fishing whereas California Department of Fish and Game biologists believe that such an increase could have a serious impact. Fish and Game biologists endorse a policy of increasing the harvest in small increments and observing the effects of each increase on the anchovy population and on the sport fishing industry. Sport fishing industry representatives oppose any increase in the harvest. They believe

that the anchovy is the last forage for game fish in the California Current and that an increased harvest would ultimately decimate the species and destroy the sport fishing industry.

Fishmeal producers expressed interest in expanding their production facilities, depending on the increase in the harvesting limit of the anchovy, the condition of the fishmeal market, and the potential return on investment.

In Oregon steelhead trout have been made exclusively a game fish; commercial fishermen may not retain the fish even when they are caught along with the primary species being fished. In North Carolina an area along Cape Hatteras was closed to commercial fishermen for 3 months during the peak fishing season.

A NMFS official told us that, in conflicts between recreational and commercial fishermen, the interests of recreational fishermen prevail simply because of their large number and the political pressure they create. On the other hand, an official of the Sport Fishing Institute told us this is not necessarily true. For example, it has been unsuccessful in its attempt to have the Government impose more stringent regulations for commercial fishermen catching Atlantic bluefin tuna--a species that has been severely reduced in number.

FEDERAL ROLE IN MARINE RECREATIONAL FISHING

Federal responsibility for marine recreational fishing was transferred in 1970 to NMFS from the Bureau of Sport Fisheries and Wildlife, Department of the Interior. In fiscal year 1976, NMFS' budget included about $2 million to perform the following activities:

--Research to provide a basis for understanding the marine resource and its surroundings.

--Management to insure rational uses of marine game fishes.

--Dissemination of resource information.

--Statistical coverage to determine fishing effort and catch.

--Economic analysis to assess the recreational fisherman's impact and needs.

To improve opportunities for participating in marine recreational fishing and resolve conflicts between recreational and commercial fishermen, NMFS proposes expanded and accelerated research to improve the management and use of recreational fisheries. NMFS believes that where stocks are subjected to competing fishermen, better and more extensive biological information will improve the regulation of the multiple fisheries and minimize conflicts.

NMFS also proposes a national data base on recreational fishermen, their fishing efforts, catches, expenditures, and the disposition of their catches. Along the same lines, NMFS suggests that national economic evaluations of marine recreational fishing are needed to develop management plans, especially where conflicts between recreational and commercial fishing interests are involved.

NMFS also supports establishing a State-Federal marine fishing licensing system and using the income generated through licensing fees for research and management and other programs to maintain and enlarge recreational opportunities. Other major actions suggested by NMFS include:

--Increasing the number and types of fisheries resources for recreational use.

--Increasing access for anglers to shorelines, waters, and fish.

--Determining the needs of commercial enterprises in developing facilities and services on which recreational fishermen depend.

The recent enactment of Public Law 94-265 should help to alleviate some of the conflicts between recreational and commercial fishermen. The act requires that fisheries be managed on the basis of their optimum yield. This provides for the greatest overall benefit to the Nation, particularly with regard to food production and recreational opportunities.

Public Law 94-265 also requires that the regional fishery management councils prepare plans in conformance with national standards for fishery conservation and management. This should help to limit differences among the ways States manage recreational fisheries.

CHAPTER 5

THE FISHING INDUSTRY IN OTHER NATIONS

In spite of man's long association with fishing, exploitation of fish on a worldwide basis has existed only for a short time. Production of fish and shellfish have increased more than tenfold over the past 70 years until the world catch is now around 70 million tons per year. The greatest increase has occurred in recent years.

However, despite the progress made in fish harvesting techniques, the modern fishing industry still has much in common with that of the past. It remains the only major food-producing system in the world that continues to rely on hunting, exploits wild stocks, and harvests fish which are generally considered to be common property. The situation of the past has changed in one important respect: today few major stocks of familiar types of fish remain undiscovered or unused. The world fishery is moving toward a time when increases in production from traditional stocks will depend on the effectiveness of managing the resources. Major changes are also taking place in the laws that govern marine resources.

We reviewed the fishing industries in seven countries. We visited Canada, Denmark, Japan, the United Kingdom (U.K.), and West Germany and obtained information on Mexico and the Soviet Union from literature available at NMFS. (See app. IV.) Our rationale for selecting the fishing industries in these countries for review is that they provided us with a cross section of countries that either (1) fish extensively off the U.S. coastline, (2) have economic and political systems similar to the United States, (3) have large, efficient, and profitable fishing industries, or (4) are neighboring countries that will affect the U.S. extended fishery zone. The purpose of the reviews was to ascertain how the countries assisted their fishing industries and provide a basis, along with other information developed, to identify alternatives to assist the U.S. fishing industry.

COMPOSITION OF FOREIGN FISHING INDUSTRIES

Fishing fleets

The fishing fleets in the countries we reviewed differed greatly from country to country. Some countries have vessels capable of large-scale fishing operations in any part of the world; others fish primarily in coastal waters. Some vessels are designed to catch only specific fish species; others

catch any fish available. Some fleets are under the full control of government; others are only partially controlled and operate very independently. Regardless of the many differences, most countries have both a coastal and a distant water fishing fleet.

The bulk of the foreign fishing fleet consists of coastal vessels, which usually weigh less than 10 tons, often are motorless, and travel only short distances. Coastal vessels range from new to 40 or more years of age. Ownership, for the most part, is private but some nations, like the Soviet Union, have a government-owned fleet. Crewmen wages are normally based on a percentage of the total catch--the larger the catch, the greater the wage. Some examples of differences in foreign coastal fishing fleets among the countries we reviewed are:

--The Canadian fishing fleet is virtually all coastal vessels.

--Even though Japan fishes worldwide, over 90 percent of its fleet is made up of small coastal vessels of less than 5 gross tons.

--Eighty-five percent of Mexico's fishing fleet consists of coastal shrimp vessels weighing about 30 tons. A large number of vessels are owned by cooperatives.

--In 1975 the Soviet Union, with the world's largest fishing fleet, had over 80,000 vessels of which 18,000 were motor powered and 4,400 were equipped for high sea, distant water operations.

Several foreign countries have recently changed the composition of their distant water fishing fleets. Many older, smaller vessels have been withdrawn from service, and a few larger, modern boats have been added. Japan, West Germany, and the Soviet Union all have large, modern, and efficient distant water fishing fleets. For example:

--The Soviet Union and Japan both have stern factory trawlers capable of remaining at sea for up to 1 year. The stern trawlers are escorted to sea by nonfishing support vessels (mother ships) which provide logistical. support, such as food, fuel, and medical provisions. Once the fish are harvested, the stern trawlers immediately process and transfer the catch to the support vessels.

--The West Germany distant water fleet is also efficient, capturing 32 percent of the total German catch in 1975. Forty-three percent of the deep sea vessels are factory freezers, and 84 percent have fishmeal plants aboard.

Denmark and the United Kingdom have distant water fishing fleets but to a much more limited degree. The Danish and U.K. deep sea fleet fishes in the North Atlantic, but in recent years this operation has fallen off considerably because of higher operating costs and decreased fish catches. Many of the boats are quite old and can remain at sea only for a short time. A U.K. official told us many of the long distance vessels are reaching the end of their useful life and probably will not be replaced.

With the exception of the Soviet Union, most of the distant water vessels are owned by private companies and corporations. In West Germany, the fleet is divided among four private companies, three of which are subsidiaries of multinational firms. The U.K. fleet is controlled by five or six private firms.

Wage rates in the distant water fleet differ from country to country with the most common system being a base rate, plus a certain bonus based on the fish catch. In the U.K., the average annual wage of a crewman on a company-owned boat is $13,000. A crewman in the West German deep sea trawler fleet averages about $3 an hour. In Mexico, a crewman on a tuna boat landing a reasonably good harvest of 600 tons after a 60- to 90-day trip, earns about $4,000. A tuna boat captain makes around $18,500 annually. Both salaries are relatively high in comparison to the average Mexican worker.

Fish-processing facilities

Fish-processing facilities in the countries we reviewed ranged from small, individually owned firms to large, multimillion dollar factories specializing in many different types of fish products. Some countries with distant water factory trawlers process and freeze their entire catch while at sea. New technology and improved pollution control standards in the processing industry have caused a number of plants to improve their processing capability. In recent years, there has been a slight decline in the total number of processing plants in Japan and reduced periods of operations in Canadian plants.

Many of the shore processing plants are small firms--either family businesses or partnerships. The U.K. processing plants are usually on the market floor or close beside it, where purchases are filleted and packed in ice for

distribution to inland wholesalers and retailers. Forty-two percent of the processing firms in West Germany have 1 to 9 employees, while in Canada over 70 percent of the firms have less than 50 employees.

Many of the bigger processing plants are company run and often a part of a chain of factories at several ports. Most produce edible fish products among with fishmeal, but some of the larger plants, particularly in Denmark, produce mostly fishmeal and oil.

We toured one of the largest fish processing companies in West Germany and observed the processing of herring and cod products. In 1974 the company had sales amounting to $55 million. The plant was very clean and was highly automated, having cleaning and filleting machines; automatic tin and glass scaling machines; equipment for labeling, wrapping, and scaling fish products; and a quality control department.

Cooperatives are another important form of fish-processing business, especially in Denmark, West Germany, and Mexico. Membership in these organizations can range from a couple of small private firms up to several hundred.

We visited a Danish cooperative that had a membership of 40 processing firms. Employment ranged from 3 people up to 20 to 30 people. It has been in operation for 18 years and leases its land from the government for a 75-year period. All members of the cooperative are engaged in producing finished fish products (smoked fish, fish cakes, pickled herring, etc.), and none are involved in the actual catching of fish.

Most of the cooperative's processed fish is sold to fish markets, stores, and restaurants in the immediate area. Employees of the cooperative earn an average of about $220 a week. An incentive system exists where several workers function as a team and receive a bonus measured upon the number of fish they are able to process. Team pressure improves performance. The Danish Government inspects the cooperative at least once a year. It checks and records such items as where the fish were caught, size, and sanitation conditions within the processing plant.

Processing aboard freezer factory trawlers consists of automated processing lines, refrigerator freezer capability, and storage space. Processing lines on the newer Soviet ships include canned, frozen, and salted products. West German factory trawlers can also produce fishmeal.

In West Germany, we toured a stern trawler that had processing capability. The vessel was in the 2,000 to 3,000 ton class and had a crew of 90. While at sea, the ship catches and processes fish around the clock with crews working on a shift basis. The ship has four automated processing lines--three for herring and one for cod. The ship has the capability of processing 50 tons of herring and 30 tons of cod each day. Processed fish are stored in freezers below deck. Fish residue is later reduced to fishmeal. The entire processing operation appeared to be quite efficient and sanitation conditions aboard the ship were outstanding.

A large percentage of processing facilities in Denmark are foreign owned as the Danish Government maintains a liberal attitude toward foreign ownership of fish-processing plants. Since 1971, the Mexican Government has increased efforts to improve the operation of processing plants. A $4 million modern cannery plant was constructed, and in 1973 a major processing port was modernized to increase capacity for producing canned fish and fishmeal.

Fish marketing and distribution systems

Generally, the market and distribution system in the smaller countries is much more efficient than that of the larger nations. The smaller countries require a much less sophisticated distribution system and are generally able to provide fresh fish products throughout the country within the day. For example, West Germany, with morning fish auctions, is able to market and distribute over 90 percent of the day's catch as fresh fish.

The larger countries, such as the Soviet Union, are ill-equipped to provide fresh fish products to the inland population. They rely extensively on frozen fish products. Variation in the quality of Canadian fish products has reduced their acceptability to consumers. Because Canadian port markets seldom pay more for better quality fish and have no official quality inspections at dockside, fishermen are indifferent to the quality of fish landed. As a result, fish products deteriorate very rapidly and can cause subsequent market losses. Canada loses an estimated $25 million annually in fish products classified as unfit for human consumption.

Economic effects

Per capita consumption of fish products for the Soviet Union, U.K., Denmark, and Japan is much higher than that of

the United States. Japan has the second highest rate in the world. Canada, Mexico, and West Germany have a per capita consumption rate comparable to the United States or a little below.

Of the seven countries, only the Soviet Union is able to satisfy the domestic demand for fish through its own catch. Only about half of West Germany's demand is met by its own fishing fleet and it must rely heavily on imports, especially fishmeal and oil. Canada also imports large quantities to satisfy local demand.

All of the countries we reviewed import and export fish products--some more extensively than others. Japan is the largest fish exporter in the world and the second largest importer (the United States is the largest). Many countries import specific fish species to satisfy a high local demand or export one which is unique to the rest of the world and commands a good market price.

The contribution of fishing to national economies is quite small, less than 1 percent of the gross national product in Japan and Mexico. Denmark is an exception with about 2 percent. Nationally, even though somewhat small, the fishing industry contributes to employment, technology, international trade, and foreign exchange. The fishing industry plays a much more significant role in the social and economical balances of a region. In some coastal areas, fishing is tremendously important as it diversifies local employment and utilizes the inshore resources. Often, fishing is the only industry in these regions.

GOVERNMENT ROLES IN FISHERIES

National fisheries agencies

In all seven countries, one or more national government agencies were involved with that country's fishing industry. The amount of involvement ranged from complete involvement in the Soviet Union where the industry and government are one and the same to the relatively hands-off approach of the Danish Government. In none of the countries was the fisheries agency considered to be a major government department. However, the importance of fishery agencies has been increasing in recent years because of increasing concern over assuring an adequate harvest and of keeping the industry economically viable and the growing awareness of the increasing importance of fish products in international trade.

In Japan, West Germany, and the U.K., the fisheries agencies are branches of the Ministries of Agriculture and/or Food and Forestry. In Mexico the fishery agency is a branch of the Ministry of Industry and Commerce. Canada has a Minister of State for Fisheries who serves as the informal head of the Fisheries and Marine Service in the Department of the Environment. Denmark has a separate Ministry of Fishing.

Historically, the fishery agencies have been principally concerned with providing an adequate fish supply at reasonable prices and with maintaining or increasing the prosperity of the fishing industry. In recent years the fishery agencies were becoming increasingly aware of the need to conserve and develop fish stocks both off their own coasts and in the high seas. All the countries have become parties to one or more international fishery management arrangements.

All the fishery agencies conducted programs in one or more of the following areas: research, resource management, financial subsidies, enforcement, inspections, and training.

Research programs were usually conducted through a network of research laboratories and experiment stations. Most countries also operated research vessels. The research programs are mostly directed at the study of marine fish resources, including the state of fish stocks, fluctuations in stock size, seasonal movements, and the exploration of new fishing grounds. Also included in most research programs are investigations into methods of fish catching and into fish-processing technology.

Some fishery agencies, particularly those in Japan and Denmark, were very concerned about the sanitation and quality of fishery products. The Danish Fishery Ministry enforces stringent quality controls over all phases of the fishing industry's operations, including the condition and form of the final product, particularly when the product is destined for the export market.

The Soviet Union, Japan, and Mexico emphasized training. The Soviet Ministry of Fisheries operated a fleet of 22 training vessels in 1975. Japan has 17 universities having fisheries curriculum and over 50 high schools specializing in fisheries education. Mexico has established technical fishery schools to increase the number of trained personnel in the fishing industry.

International fisheries organizations

After the Second World War many nations became increasingly concerned about the need to promote cooperation and coordination among fishery bodies, so that the conservation and rational exploitation of fish resources could take place. Actually the first international body responsible exclusively for fisheries was established in 1908 by the treaty signed by Canada and the United States with respect to fish resources in waters contiguous to these countries. Several other agreements were established before the Second World War. These included the 1923 treaty between Canada and the United States for the protection of Pacific halibut and the 1930 agreement between the same countries establishing the International Pacific Salmon Fisheries Commission.

The first multilateral agreement setting up a fishery body was concluded in 1946 by the 17 countries signing the International Convention for the Regulation of Whaling. This was closely followed by several others including the Northeast Atlantic Fisheries Commission in 1946, the Inter-American Tropical Tuna Commission and the International Commission for the Northwest Atlantic Fisheries in 1949, and the International North Pacific Fisheries Commission in 1952. As of 1975, according to the Food and Agriculture Organization, some 25 fishery bodies are in operation.

The main objective of most international fishery bodies is formulating conservation measures designed to preserve and develop fish resources. The international bodies conduct various activities in formulating conservation measures. These activities range from collecting and compiling statistics, through various aspects of scientific research--particularly the evaluation of the state of the fishery--to examining the social and economic implications of different management measures.

FINANCIAL SUPPORT TO THE FISHING INDUSTRY

The diversity of financial aids, differences in the fishing industries, and diversity of national motives behind aid programs makes it difficult to compare and assess financial supports in those countries we reviewed. The amount of support ranged from simple government-backed bank loans in Denmark to a very comprehensive program of various aids in Japan to a government-owned and operated fishing industry in the Soviet Union.

Financial aids have facilitated capital investment in fishing vessels and processing facilities and have been made available for various price support systems. Financial aids have been made in the form of grants, interest rebates, loans, and tax reductions. Grants made by the government to the fishing industry are not repaid. Interest rebates are allocated either directly by the government treasury or indirectly through some government-owned or privately owned banking system so that the borrowers obtain loans at interest rates lower than the interest rate prevailing in the country. Loans are provided at prevailing interest rates from the government or by private banks with a goverment guarantee.

Capital investment aids

All the countries we reviewed provided aids to facilitate capital investment in fishing vessels and some provided aid for processing facilities. The Canadian Government has conducted a fishing vessel subsidy program since 1944. Currently the Federal Government will pay 35 percent of the approved cost of any eligible fishing vessel. In fiscal years 1974 and 1975, the Canadian Government paid $14 million in subsidies to construct 725 vessels. Canadian provincial governments also provide various capital investment aids.

Between 1970 and 1975, the Mexican Government invested $198 million in fishing vessels. In addition, in 1974 Mexico received a $43 million loan from the Inter-American Development Bank to construct 323 fishing vessels to harvest principally shrimp and snapper and, to a lesser extent, sardines, anchovy, mackerel, and other finfish. Also in 1974, the Bank of Brazil extended $30 million in credit to Mexico for the purchase of Brazilian built fishing vessels.

The West Germany Government has aided investment in fishing vessels through grants, loans, and interest reductions on money market loans. In 1974 West Germany made $11.3 million available for the various vessel construction aid programs, of which $5.5 million went for loans for new, large distant water fishing vessels.

The U.K. provides extensive grants and loans for investing in new vessels and for acquiring and improving existing vessels. For the year ended April 1975, the U.K. Government approved 14,732 grants totaling $124 million and 2,837 loans totaling $103 million.

In Denmark financial support is given in the form of loans provided by the State-owned Royal Danish Fisheries Bank. The loans are given to facilitate new vessel construction

and the improvement of existing boats as well as to modernize and expand the processing sector. During fiscal year 1974, loans were made amounting to $16 million, chiefly for new vessel construction. The loans carried a 9-percent interest rate and were repayable in 10 to 15 years. Danish tax regulations allowing accelerated depreciation also encourage capital investment in vessels and shore facilities. These measures are a major impetus behind new investment during particularly profitable periods because of the high level of Danish taxation.

The Japanese Government conducts a number of capital subsidy programs for fishing vessels and shore facilities. In fiscal year 1976 the Japanese Fisheries Agency received an operating budget of $472 million. Separate funds for loans, investments, and insurance programs provided the agency with an additional $637 million in fiscal year 1976.

Aids to facilitate operations

In the countries we reviewed, aids to facilitate operations took many forms and were often given for social as well as for economic reasons. Price support systems of various types exist in Canada, Mexico, Japan, and through the European Economic Community for member countries which includes West Germany, Denmark, and the U.K. Price support systems are usually designed to protect fishermen against sharp declines in prices and consequent loss of income due to causes beyond the control of the fishermen.

Under the European Economic Community price stabilization program, subsidies may be provided when fish cannot be auctioned at the minimum price and are sent to the fishmeal plant. The producer then receives a subsidy which partially makes up the difference between the very low fishmeal plant price and the established minimum price.

Examples of other types of operating subsidies in the countries we reviewed are as follows:

--Canada has or has had aids which provided working capital loans for inventory financing and product promotion and for insurance against vessel loss.

--The U.K. has provided operational subsidies in the form of flat rate daily payments apportioned according to vessel size.

--During the energy crises, which sharply raised fuel prices, Mexico, Denmark, and West Germany provided fuel cost subsidies.

--Japan has provided extensive aids, including vessel insurance and disaster compensation, medical examination and treatment at sea, and fishing boat crew salary insurance. A major part of Japanese Government assistance goes to small- and medium-scale fisheries where the standard of living of the fishermen involved is very low.

ISSUES CONFRONTING THE FISHING INDUSTRY WORLDWIDE

The fishing industries in the countries we reviewed were in a state of change and uncertainty. Many segments of the fishing industries were overcapitalized; i.e., too many vessels and fishermen in relation to available fish. Overcapitalization difficulties are being compounded by the declining abundance of fish especially on the traditional fishing grounds. As overfishing becomes more widespread, the shortcomings of existing international fish management arrangements to conserve fish stocks are becoming more apparent. These developments, together with the tremendous increase in distant water fleets, are increasing the tendencies toward extension of coastal jurisdiction over fishing.

Excess harvesting capacity

Except for the Soviet Union, where information was not available, one or more fisheries in each of the other countries we reviewed suffered from excess harvesting capacity. On fishing grounds to which there is common access, international competition is intense and made worse by the economic pressure on the fisheries in individual countries. As harvesting capacity grows the profits from fishing become increasingly dissipated. The harvest of a given stock diminishes only when the returns to the most efficient fishermen fall below the level considered to be economically worthwhile.

In addition to dissipating profitability, the Organization for Economic Cooperation and Development Committee on Fisheries points out that overinvestment in fisheries detrimentally influences the management schemes set up to control the fisheries. Few management schemes are prepared for or even envisioned having to deal with the problem of surplus fishing power. Countries having too big fleets are always inclined to ask for too big quotas or to object to necessary restrictions. In this respect, the loopholes in the scientific assessment of the state of the resources can be exaggerated and used to reject the scientists' recommendations.

In three of the European countries we reviewed, the distant water fleets were the most affected by excess capacity. These fleets contain the largest and some of the newest vessels these countries possess. The profitability of these fleets could become even further depressed if their access to fishing grounds is further curtailed by the worldwide trend toward extended national jurisdiction. The Canadian Government feels the fishing industry, particularly the inshore part, generally suffers from overcapacity. In Mexico, the rapid buildup of shrimp boats is causing concern. According to an OECD report, the Japanese have been notably successful in controlling the size of their fleet, but even there the tuna-fishing fleet suffers from excess capacity.

Various factors have led to excess fishing. The Canadians believe their industry's overcapacity is the result of competition among fleet owners and fish buyers for a dwindling supply of fish. They point out that, when an industry is based on a resource that belongs to all (common property), the danger of overexpansion is always present. Market forces rarely prevent this. More often, competitors in an unchecked scramble for advantage force each other to the verge of collapse. The OECD Committee on Fisheries has pointed out that the setting of national quotas through an international management scheme or even the prospects of the future introduction of national quotas have been sufficient to accelerate investment, all national fisheries competing for the biggest share of the limited resources.

The Canadians and Japanese feel that their capital investment subsidy programs have contributed to the buildup of excess fleet capacity. The governments of Denmark, West Germany, U.K., and Mexico have also encouraged capital investment through public assistance programs. The OECD Committee on Fisheries has concluded that the pressure on many fish stocks would not have been so severe if building vessels able to reach them had not been aided financially from public funds. OECD also found that government financial aid to the fishing industry had generally ended up by maintaining overall fishing at a maximum compatible with the public funds allocated.

Another factor contributing to overinvestment in Canada has been industry reaction to fluctuations, often of some magnitude and usually unforeseen, in the fish stocks available for harvest. Industry reaction has frequently been to install sufficient catching and processing capacity to handle the peaks in supply, thereby inflating industrial overheads and reinforcing the inherent tendency toward overexpansion.

An OECD study mentioned one last factor, contributing to maintaining unwarranted fishing, which is technical, economic, and social in nature. Boats and men engaged in fisheries are specialized and cannot easily be adapted to other activities. Boats which could only be sold at scrapping prices are kept fishing although, on a purely economic basis, they should be withdrawn. Fishermen sometimes accept incomes lower, even much lower, then average income in other industries.

Measures to control fishing

To prevent the dissipation of profitability and achieve efficient allocation of capital and labor in the fishing industry, some system for removing the condition of free and open access is needed. Of the countries we reviewed, Japan and Canada have extensive measures to control fishing. The U.K. has recently introduced licensing schemes to administer the quotas agreed on at international fishery commissions. The Mexican Government licenses all domestic and foreign vessels fishing in Mexican waters to insure that the management programs for fisheries are enforced. Denmark employs a licensing scheme only for the small salmon fishery in the waters off Greenland to insure that quotas are respected. In West Germany fishing vessels are not required to be licensed, but West Germany anticipates that licensing may become necessary in the future due to the increasing use of quotas to control fish catch.

Japan's fishing industry is governed by a complex system of national and prefectural (State) fishing rights and licenses. Coastal fisheries are governed by prefectures, in accordance with national fishing laws. The prefectures regulate fishing seasons, zones, size of catch, method of fishing, and quotas on catch for certain species. The Japanese National Government regulates offshore and distant water fisheries, although offshore fishing licenses are granted by the prefectures.

Japan controls and coordinates the nation's fisheries as a unit. Fishing is controlled through increasing or decreasing the number of licenses made available. Every 5 years, the Central Fisheries Coordination Committee, an advisory body of the Ministry of Agriculture and Forestry, determines the number of vessels that are to be licensed, by size class, fishing area, and periods of operation. This determination is based on considerations, such as resource conservation, number of vessels already engaged in each fishery, and financial and managerial aspects. When reductions are decided on, the government works with the network

of fishermens' cooperative associations to accomplish the desired results.

The Canadian National Government is planning to take additional steps to limit access to fishery resources. The Canadian Government's recent policy for its commercial fisheries states that if Canadian society as a whole is to get the best combination of benefits from development of the fisheries, open access to resource use must be curtailed. If it is not curtailed, the lure of a quick profit and other short-term gains will continue to produce overcrowding in the fisheries and a proliferation of fleets and processing facilities. This kind of congestion leads eventually to depletion of fish stocks and a waste of social resources.

The Canadians believe that productive fishing enterprises operating in an entry-controlled fishery earn more. There should be a surplus in relation to normal returns for the labor employed, the capital invested, and the business risk taken. The management authority would have three alternatives for distributing this surplus: (1) it could let the surplus accrue to the participating enterprises, (2) it could permit the entry of additional enterprises to dissipate the surplus, and (3) it could appropriate the surplus through collection of royalties, on behalf of the resource owners; i.e., the people of Canada.

The Canadians find alternative 1 justifiable for certain fisheries to raise the level of earnings and so stimulate new investment. In most cases, though, since it could create a class of privileged fishermen, this is an inequitable alternative.

Alternative 2 might be desirable in situations where the need to create employment opportunities is important. However, on conservation and economic grounds, this approach would not usually be acceptable.

Alternative 3, which amounts to receiving rent from an asset owned by the public, is analagous to the recovery of royalties from industries like forestry and mining. It can be justified because the State provides services to maintain and enhance the fishery resources, an asset owned by all citizens.

The Canadians have already implemented a comprehensive limited entry program for their Pacific salmon fishery. Details on this program are contained in the Profile on the Canadian Fishing Industry. (See app. IV.)

Shortcomings of existing international fish management arrangements

In a September 1976 report prepared by the Institute for Marine Studies, University of Washington, under contract with GAO (see app. VI), it was concluded that the vast majority of international fishery conventions and agreements have been concerned almost solely with the conservation of the resources. 1/ This objective was reasonably well met in the early years of the conventions, and during the years following World War II (1945 through about 1960) these arrangements achieved considerable success. In recent years, however, as a result of the tremendous growth in fishing, accompanied by the lack of adequate methods to deal with this increased fishing and the increased number of nations participating, overfishing of major stocks of living marine resources off the coast of the United States has occurred.

Similar conclusions about the effectiveness of existing international arrangements are being reached by others. The West German Federal Government favors increased fish conservation measures and West German officals told us that they feel fish stock protection measures taken by international fishery commissions have generally been too weak and too late. In the U.K. several officials we interviewed spoke of the inadequacy of current conservation measures. They believe that quota agreements which have been the basis of international catch control have not worked. Canadian officials also believe that international arrangements, especially those in the Northwest Atlantic, have not effectively conserved fish stocks.

Difficulties in determining a catch level in harmony with conservation goals and assuring that the agreed on catch level is not exceeded are the principal shortcomings of existing international arrangements. The first techniques used by international fish management conventions to prevent overfishing of stocks consisted of controlling the mesh size of nets and the minimum sizes of marine species. Experience showed that these methods were inadequate to eliminate overfishing and countries then tried control measures covering fishing areas and periods. More recently there has been a move in favor of controlling what is called the fishing effort, which can involve either fixing an overall

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1/The statements and conclusions contained in this report are solely those of the University of Washington and do not necessarily represent the views of GAO.

catch quota for some species--fishing being suspended when the quota has been reached--or fixing an overall quota to be allocated among the various fishing countries.

Scientific evidence concerning the biological state of fish stocks usually forms the basis for setting catch quotas. However, as an FAO official has pointed out, setting a catch quota is not as simple as it appears. The assessment of the state of fishery resources involves interrelated problems, many of which are not well understood. Furthermore, any stock is subject to substantial year-to-year fluctuations, and knowledge of the causes of fluctuations, methods to predict them, and means to minimize their effects on fisheries is poor. Additional complications are introduced in many cases due to the multispecies nature of many fisheries. In these cases, the total yield from a variety of species might remain at approximately the same level but the species composition of the yield might change greatly.

While it is difficult to set an overall catch quota, it is a much more delicate matter to break down the overall quota into individual national catch quotas, because appropriately determining the respective shares of countries with coasts bordering on waters coming under the fishing-effort regulations, countries that have traditionally fished in these waters, and other countries is difficult. In the early 1970s, the International Commission for the Northwest Atlantic Fisheries developed an allocation system which takes into account the special interest of coastal States and establishes national catch quotas for almost every one of the important stocks in the region. The situation of new entrants in national quota schemes also has to be dealt with.

Even where catch quotas have been established and national allocations set, they must be enforced to be effective. Enforcement of international fishery conventions is generally left up to each participating country to see that vessels under its authority do not violate the agreement. Many believe this voluntary compliance system is not working. OECD officials told us that no country has really tried to enforce quota systems. U.K. officials also felt that the fishing fleets of many countries violated the letter and spirit of international agreements. They believe this situation is tied to the lack of sufficiently stiff penalties and general lack of enforcement.

Trend toward extended fishery jurisdiction

The principle of the freedom of the seas was first advanced in 1608. It became fully established when the

colonies were settled and the colonial powers found it mutually advantageous to respect each other's ships on the high seas. Since then, the major maritime powers have upheld the freedom of the seas. These powers prevailed in 1958 and 1960 during the first and second United Nations Conferences on the Law of the Sea. In 1958 only six nations claimed exclusive fishing limits more than 12 miles from their shores. In 1975 FAO prepared a summary of the latest claims of coastal States with respect to their territorial sea and adjacent exclusive fishing zones. By then, 34 nations claimed exclusive fishing limits beyond 12 miles from their shores. Most of these were either African or Central and South American countries.

In 1973 the third United Nations Conference on the Law of the Sea convened. This conference dealt with marine resources and activities, including the question of jurisdiction and control over living resources of the sea. The fourth session of this conference ended on May 7, 1976, with a revised single negotiating text. Under this text, the coastal country is given an exclusive economic zone extending for 200 miles.

Many developments have occurred in fisheries that have warranted formulating new fishery arrangements. In a paper prepared for an OECD symposium, the Resources for the Future, Inc., pointed out several of the particularly important developments in fisheries. One of these is the rapid growth in world fishing combined with the recognition that supplies are limited. As this has occurred, it has increased the value of fish stocks.

A second development has been the rapid growth in the quantity and extent of distant water fishing. This fishing brings fleets of large foreign vessels into waters that have been traditionally fished by the small craft of the coastal State. The coastal State fishermen have reacted by demands for extending their zones of exclusive jurisdiction.

Worldwide extended national fishing jurisdictions will substantially affect many world fisheries. An FAO official has pointed out the major effects. First, extended jurisdiction will result in a major redistribution of fishing effort and catches since a substantial portion of the world's distant water fishing fleet will have to be either relocated or laid off. This is particularly true for the North Atlantic, the North Pacific, and along the west coast of Africa. Emphasis will naturally shift from distant water operations to short- and medium-range operations, and this could change the pattern of fishing as well as the types of vessels and equipment used on a worldwide scale.

The FAO official emphasized, however, that extended jurisdiction does not mean that there will be no fishing by foreign vessels in waters under the jurisdiction of coastal nations. There are already many bilateral agreements, joint ventures, and other arrangements under which foreign fishing is allowed within the limits of national jurisdiction.

Extended jurisdiction has spurred interest in joint ventures. The OECD Review of Fisheries for 1974 commented that one of the outstanding features of that year was the substantial growth in joint ventures. The motivation often lay in an interest in the fisheries either as a source of supply for particular products or to obtain concessions for vessels operating in adjacent waters. OECD said these ventures were the natural reaction to the trends of the immediate past or expected in the near future heading away from the regime of free access to all but narrow coastal zones and having instead most of the main demersal (found on or near the bottom of the sea) fisheries and practically all shell fisheries under the sovereignty of the nearest coastal nation.

Japan, the Soviet Union, and other distant water fishing nations have been increasingly seeking joint fishing ventures with coastal nations. Joint ventures are particularly being sought with nations which already have or are expected to soon extend their fisheries jurisdiction zone. NMFS officials expect that proposals from Japan, the Soviet Union, and others for various kinds of joint ventures will be forthcoming as a consequence of the United States extending its fisheries jurisdiction zone. In making such proposals, these countries would be well served by their large fleet of factoryships and refrigerator transports which could be offered to receive and process fish caught by U.S. fishermen. Such offers might be particularly attractive on fishing grounds, such as in the eastern Bering Sea, which are remote from U.S. facilities for processing groundfish, but where a fleet of modern U.S. crab vessels operate and could readily convert to trawling.

Impact of extended jurisdiction on selected countries

Of the seven countries we reviewed, Japan, the Soviet Union, and West Germany will be most affected by the trend toward extended jurisdiction over fishing. The distant water fleets of Denmark and the U.K. will be less affected. Canada and Mexico will gain control over extensive resources off their own coasts.

In Japan the establishment of a global 200-mile economic zone is, justifiably, a highly sensitive issue. Fish and shellfish comprise over 50 percent of the Japanese intake of animal protein, and with coastal and inland fisheries contributing less than 30 percent of Japan's total fish catch, international fishing grounds are vital. About 40 percent of Japan's 1974 fish catch came from waters within 200 miles of foreign countries.

Nonetheless, the Japanese are resigned to the imminent arrival of worldwide extended jurisdiction, expected to be established through the Law of the Sea Conference. The Japanese are, however, strongly opposed to countries taking unilateral actions establishing 200-mile fishing zones as the United States and Canada have done. They are also opposed to the idea of coastal countries being granted the right to exclusive control over resources in areas exceeding 200 miles from the coast.

Although it is not clear yet how Japan will tackle the problems imposed by extended jurisdiction, several observations can be made. Japan's new coastal fisheries development program plans to increase coastal production by 660 million pounds. Research programs are underway to locate new fishing grounds, develop underutilized species, and to promote the more effective utilization of currently caught species. Joint ventures are another possibility. Japan's main approach, however, will probably be through bilateral negotiations for rights to fish, striving for large quotas based on past level of catches.

The recent U.S. unilateral action creating a 200-mile fishery zone beginning March 1, 1977, has upset the Japanese. They perceived the U.S. position as favoring the multilateral approach of the Law of the Sea Conference. They considered the U.S. action as excessively severe, asserting that the restrictions imposed could seriously affect the country's food policy and Japan-United States relations. Japan catches about one-seventh of its total catch in U.S. waters, mostly from the Bering Sea and Northeast Pacific Ocean.

In view of overall Japan-United States economic and political relations, U.S. Embassy officials expect the bilateral fishing negotiations to be very difficult. The Japanese hope that the United States will recognize its historical fishing rights and grant Japan "first use" of American waters.

One possible solution surfaced in a recent commercial joint venture proposal, whereby U.S. fishermen would catch

Alaskan pollock for delivery to Japanese processing vessels. The National Marine Fisheries Service analyzed the proposal, finding no legal objection to the plan. NMFS also believes that such joint ventures could be beneficial to the development of a U.S. bottomfish industry in Alaska.

The Soviet Union's most recent position at the latest Law of the Sea Conference was support of a 200-mile economic zone in which the coastal countries have sovereign rights to all resources within their respective zones. About half of the Soviet's total fish harvest is off the coasts of foreign countries. To assure the future viability of the Soviet fishing industry, the Soviet Government, according to a NMFS translation of a Soviet document, feels that other countries should be permitted to fish in underutilized portions of the 200-mile economic zone. Under its proposal, countries would receive compensation for allowing foreign vessels to fish in their economic zones.

According to an NMFS official, the Soviet Union has not made a formal response to the proposed extension of the U.S. fishing zone. Informally, the Soviets have indicated a willingness to abide by U.S. quotas and to fish species not fully utilized by U.S. fishermen.

West Germany has very limited territorial waters and, as a result, conducts extensive distant water fishing. But despite the threat to its fishing interests, West Germany favors the establishment of 200-mile limits by coastal nations because its officials believe it will result in better management and conservation of fish stocks. West Germany does not fish extensively in U.S. coastal waters.

The future of Denmark's fishing industry will in part be shaped by the implementation of a worldwide 200-mile fishing zone. Up to 50 percent of Denmark's catch is taken from areas that could be lost to the jurisdiction of other countries. Danish Government officials have stated a preference for a smaller limit than 200 miles. Denmark's primary concern is protection of its traditional fishing areas. Denmark should not be affected by the U.S. 200-mile limit because it has stopped fishing in U.S. waters.

In the U.K. industry officials are pressing the government for an economic zone of 200 miles and an exclusive 100 mile-median fishing zone within the European Economic Community. They consider this to be the most crucial single factor affecting the survival of fish stocks and the U.K. fisheries industry. U.K. officials believe there is little doubt that their distant water catch will continue to decline. The U.K. conducts very little fishing in U.S. waters.

EFFECT OF EXTENDED FISHERY JURISDICTION BY THE UNITED STATES ON INTERNATIONAL FISHERIES CONVENTIONS AND AGREEMENTS

The United States is a member of eight international fisheries and marine mammal conventions designed to provide for the conservation of living resources and for the orderly operation of fishing vessels of various nations fishing common stocks of fish on common fishing grounds. In addition, the United States is a party to 10 executive agreements which provide a basis for dealing with particular problems of a bilateral nature. In its report prepared for GAO under contract, the University of Washington's Institute for Marine Studies assessed the effects of extended U.S. fishery jurisdiction on the international fisheries commissions and conventions and on bilateral executive fishery agreements. A summary of the assessment follows.

The conventions and executive agreements were quite successful during the years of their implementation, but in recent years the number of foreign nations and the number of foreign flag vessels have increased to the extent that the effectiveness of the conventions and agreements has become increasingly less effective in conserving the resources and protecting the rights of fishermen.

Public Law 94-265, in an attempt to correct this imbalance, requires renegotiations by May 1, 1977, of the fisheries treaties and executive agreements to bring them into conformance with the new law. This appears to be an almost impossible task since it is unlikely that many foreign nations fishing off the U.S. coast will agree with the United States unilateral extension of exclusive jurisdiction to 200 miles or accede to its demands for the acceptance of U.S. sovereignty over fishery resources within the zone.

In the Northeastern Pacific Ocean, it is likely that the United States and Canada can reach agreement quite easily on reciprocal fishing rights within the 200-mile zones of each country although a different division of the catch between the fishermen of the two nations, in favor of U.S. fishermen, will probably result.

Problems with other nations, such as Japan and the Soviet Union which have major and traditional fisheries off the coast of the United States, will be complicated by the existence of the Japanese high seas salmon fishery and because of the apparent depletion of such major species as Alaskan black cod and Pacific hake. It can be anticipated that prolonged negotiation will be necessary to resolve the

jurisdictional, conservation, and allocation problems between these nations and the United States. Additional problems can be anticipated because of the growing fisheries of South Korea, Taiwan, and Poland in the Northeastern Pacific Ocean.

On the Atlantic coast, the major international fisheries treaties and executive agreements involve the large and mixed stocks of fish occurring off the coast of the United States from Cape Hatteras in the south to the Canadian border on the north. About 15 separate species of fish are fished extensively and in common by fishermen of the United States and about 15 foreign nations. During the past decade the biomass of fish in the area has declined about 33 percent with severe economic consequences to U.S. fisheries.

Recent Northwest Atlantic Fisheries Commission action has partially ameliorated the problem. Nevertheless, strong concern on the part of fishermen and the general public along the Atlantic coast remains, and it is likely that any new agreements with foreign nations regarding their continued fishing without mutual acceptance of U.S. sovereignty over fisheries out to a limit of 200 miles will be severely criticized by these groups. Prolonged negotiations and great difficulty can be anticipated in reaching agreements, especially in view of Public Law 94-265 which requires acceptance by foreign governments of U.S. absolute sovereignty over the fisheries resources.

In the Gulf of Mexico the situation is somewhat reversed. About 400 U.S. shrimp fishermen fish off the coast of Mexico and other Caribbean nations for shrimp and about 40 harvest finfish. Mexico has extended its jurisdiction over fisheries to 200 miles, and it appears certain that many other Caribbean and northeast coast South American countries which have not yet extended their jurisdiction will follow soon. The U.S. Government in this case will be required to attempt to negotiate for continued U.S. shrimp and red snapper fishing off the coast of these countries. Public Law 94-265 provides for the prohibition of the imports of fisheries products from nations which refuse to conclude an agreement permitting U.S. fishing vessels continued access to fishery resources if such U.S. vessels have traditionally fished in waters off the coast of foreign nations.

The United States is a member of two multinational fishery commissions dealing with highly migratory species of fish, such as tuna--the Inter-American Tropical Tuna Commission and the International Convention for the Conservation of Atlantic Tunas. Because the majority of the efficient tuna fleet fishes almost entirely off the coast of foreign

nations, it will undoubtedly be necessary to renegotiate the provisions of these two Conventions. Coastal nations involved will demand greater coastal state jurisdiction over tuna-fishing vessels fishing within their 200-mile limit. On the other hand, law provides for international agreements regulating the conservation and management of these highly migratory species. One can predict again a prolonged period of negotiation and confrontation with coastal states off whose coasts U.S. fleets fish for tuna.

Two important marine conventions will be affected by the extension of jurisdiction to 200 miles. The International Whaling Convention permits limited whaling in almost all oceans. Whaling nations, such as Japan and the Soviet Union, will be affected by extension of jurisdiction since they take significant numbers of whales within the 200-mile limit of many coastal nations, including the offshore waters of the United States; thus, modifications to the Convention will be necessary. In spite of these problems for the whaling nations, it appears that the convention should continue in a modified form and will not require major modification in its mandate.

The North Pacific Fur Seal Convention has been an effective means of conserving and allocating the harvest of Pacific fur seals. It may require some modification to take into account the coastal migrations of fur seals within the 200-mile limit of Asia and North America. However, it would appear most likely that this convention will continue with relatively little change in substance with respect to its charter.

The 10 executive agreements between the United States and foreign fishing countries for the most part will not be continued much beyond March 1, 1977. These were negotiated to resolve specific problems and conflicts of a relatively transitory nature. During the transition period until the U.S. 200-mile extended jurisdiction is generally accepted, continuing certain of these agreements may be needed. The shrimp agreement between the United States and Brazil is one of the executive agreements that should be continued. It is desirable where possible to incorporate the appropriate provisions of the current bilaterals into new agreements with foreign nations.

As pointed out by the President in signing Public Law 94-265, its provisions deviate significantly from the draft text of the Law of the Sea Convention. The enforcement articles of the draft text provide for significantly different and considerably less stringent provisions in our domestic

law. Still other sections of our domestic law, for example those dealing with import prohibitions (section 205), are contrary to both national policy in other areas of concern to the United States and to certain international commitments of the United States especially those provided for in the General Agreement for Trade and Tariff.

CHAPTER 6

FEDERAL INVOLVEMENT IN FISHERIES

The Federal Government is involved in many fishery-related programs having diverse objectives. The National Marine Fisheries Service is the principal Federal agency responsible for carrying out programs of the U.S. fishing industry. NMFS was established as part of the National Oceanic and Atmospheric Administration, Department of Commerce, pursuant to Reorganization Plan No. 4 of 1970. Many NMFS responsibilities were carried out by its predecessor agency, the former Bureau of Commercial Fisheries, Department of the Interior, which had been in existence since 1956.

The basic mission of NMFS is to protect and promote the wise and full use of marine fisheries resources. NMFS concerns itself with many aspects of the fisheries, primarily research programs. Basic research programs are designed to better understand living marine resources and the environmental quality essential for their existence. Applied research programs provide information on such matters as the availability of fish resources, the design and testing of gear to harvest fish resources, and the properties and methods of handling and processing fish. NMFS also performs marketing and economic research, collects and disseminates fishery statistics, provides financial assistance to vessel operators, and enforces international fishery agreements. Policies and procedures are established at NMFS headquarters in Washington, D.C. Field units, located throughout the country, consist of five regional offices, seven fishery centers, and three fisheries product utilization centers. Numerous small laboratories report through these major components.

As of June 30, 1976, NMFS had 1,762 permenent staff positions--373 at headquarters, 431 at the 5 regional offices, and 958 at the fisheries centers and other various laboratories around the country. NMFS received appropriations of $55 million, $61 million, and $69 million in fiscal years 1974, 1975, and 1976, respectively.

Fishery-related programs are also carried out by the Departments of Agriculture (Farmers' Home Administration and Forest Service); Commerce (other components of National Oceanic and Atmospheric Administration, e.g., Office of Sea Grant, National Ocean Survey, and National Weather Service and the Economic Development Administration); Defense; Health, Education, and Welfare (Food and Drug Administration); Interior (Fish and Wildlife Service); State; and Transportation (Coast Guard) and by the Energy Research

and Development Administration, Environmental Protection Agency, the National Science Foundation, the Small Business Administration, and the Smithsonian Institution. Federal participation in fisheries can be grouped into the following classifications:

--Fisheries research.

--Management programs to protect, conserve, and enchance fisheries resources.

--Assessment programs to provide biological and environmental information needed for fisheries management.

--Restoration programs to improve deteriorated fish habitats.

--Support programs to assist fishermen in obtaining needed vessels and gear.

--Development programs to (1) assist States and industry enhance commercial fisheries and (2) educate consumers about fish products.

--Inspection programs to insure the safety, purity, and wholesomeness of fish products.

--Enforcement programs to carry out fishing laws.

FISHERIES RESEARCH

In June 1974 the National Oceanic and Atmospheric Administration issued a catalog of unclassified research activities which identified projects relating to nonhuman living systems that either were continuing or had been completed in 1973. Following is a summary of the number of research projects conducted by the principal departments and agencies.

	Commerce	National Science Foundation	Environmental Protection Agency	Health, Education, and Welfare	Smithsonian Institution	Interior	Energy Research and Development Administration	Defense	Total number of projects
Molluscs-crustaceans	144	54	13	42	29	1	1	7	291
Fish populations	176	13	-	-	7	36	1	1	234
General ecology	95	50	42	1	6	10	15	2	221
Microorganisms-plankton	48	100	27	6	7	3	3	13	207
Productivity-biochemistry	53	46	10	19	2	6	19	1	156
Other animals	29	40	1	9	31	1	-	15	126
Fish habitats	41	5	8	-	2	16	5	-	77
Plants	22	10	8	2	7	1	1	3	74
Fish physiology-biochemistry	25	13	3	14	-	7	1	-	63
Total	633	351	112	93	91	81	46	42	1,449

The Departments of Agriculture and Transportation were also funding a few research projects in this area. The National Oceanic and Atmospheric Administration reported that 20 States, 2 regional commissions, and a number of private institutions, including universities, were also supporting research projects in this area.

NMFS, the principal agency concerned with marine fishing, provided the following information on funds it obligated for research for fiscal years 1974-76

Fiscal year	Amount
	(millions)
1974	$35.9
1975	41.9
1976	44.5

Information was not available from any central source as to the total funds or funds by all organizations expended on fisheries research. Accordingly, we could not determine the extent of funds devoted to fisheries research. We did not attempt to measure the effectiveness of the research because of the large number of projects and organizations involved.

Some of the research is discussed in some of the following sections.

MANAGING TO PROTECT, CONSERVE, AND ENHANCE FISHERIES

States have historically been responsible for managing domestic fisheries, and Federal management has been limited to participating in international fishing agreements. State management programs have been uncoordinated and ineffective, and international agreements have not been fully effective in conserving coastal fishery resources. These problems have impeded effective fisheries management and have led to overfishing and the depletion of certain fish stocks. Public Law 94-265 creates a new and impressive Federal role in managing both domestic and international fishing.

Domestic fisheries management

In 1969 the President's Commission on Marine Science, Engineering, and Research suggested that conflicting State laws and regulations have tended to hamper domestic fisheries and that a new framework for fisheries management was needed.

To develop a uniform management approach, NMFS established in 1971 a State-Federal Fisheries Management Program. The program creates a mechanism for resolving problems created by inconsistent State laws and for developing and implementing plans to insure fisheries are conserved. Plans are developed cooperatively by the States, NMFS, and other interested parties. Under the program, a legislative model was developed in 1975 to be used by States in adopting regulations for more effective fisheries management. However, no mechanism has been established to determine to what extent, if any, the model is being implemented.

At the time of our review, NMFS was developing a national plan for marine fisheries. One element of the plan is a continuing management system for reducing the current depletion of fish stocks and, in many cases, permitting their eventual restoration. NMFS estimates that improved fisheries management is necessary to reach the goal of increased annual harvests of about 2.3 billion pounds by 1985, a 48-percent increase over the 1975 harvest of 4.8 billion pounds. To meet the plan's objectives, NMFS estimates that in fiscal year 1985 the annual costs to the Department of Commerce would increase by $91 million.

In July 1976 the Secretary of Commerce approved the plan and NMFS was developing an approach for implementing it. The approach will detail the specific programs needed, establish priorities, and present a planning basis to enable the Department of Commerce to conserve, enhance, and insure the wise use of marine fisheries.

International fisheries management

Before the enactment of Public Law 94-265, the United States, through the Department of State, participated in 23 bilateral or multilateral fisheries agreements which were the basis for international fisheries management. NMFS assisted the Department of State by furnishing scientific advice and, when requested, participated in negotiations.

Despite the sound concept and good intent of international fishing agreements, overfishing by foreign vessels off U.S. coasts has not been prevented. For example, the International Commission for the Northwest Atlantic Fisheries was established in 1949 to conserve the fishery resources of the northwest Atlantic Ocean. However, the Commission has not been successful in preventing the depletion of certain important fish species.

The Law of the Sea Conference, sponsored by the United Nations, is attempting to implement a worldwide agreement to prevent overfishing. Also, recognizing the imminent danger to our fish stocks, the Congress has addressed the question of international management in Public Law 94-265.

ASSESSING FISHERIES AND THEIR ENVIRONMENT

Sound biological and environmental information is essential for proper fisheries conservation policies. The lack of reliable information is partially responsible for the overfishing of some species and for the pollution of waters making some fish stocks unfit for human consumption.

In 1971 NMFS, recognizing the need for biological data, instituted the Marine Resources Monitoring, Assessment, and Prediction Program to provide information needed for managing and allocating the Nation's marine fisheries resources. Under this program, NMFS collects and analyzes data to provide basic information on the abundance, composition, location, and condition of commercial marine fishery resources. The program is a nationwide effort which provides annual forecasts and warnings of changes in fish and shellfish stocks. It is conducted in cooperation with foreign fishing nations, and the data obtained is used in both international fishing negotiations and domestic fisheries management programs.

Public Law 94-265, by extending U.S. jurisdiction over fishery resources, makes it increasingly important to establish a sound biological data base. The act directs the Secretary of Commerce to initiate and maintain an expanding program of biological fisheries research concerning the interdependence of fisheries and other matters affecting the abundance and availability of fish.

The Federal Government is also involved in efforts to predict and quantify the impact of man-induced environmental changes on fish populations. The Environmental Protection Agency, the National Science Foundation, and the National Oceanic and Atmospheric Administration are heavily involved in these efforts. Examples of environmental research conducted or sponsored by these agencies follow.

--The Environmental Protection Agency studies the cause and effect relationship between the presence of waste effluents and declines in fish populations. This information is used to develop criteria for ocean dumping practices subject to the agency's regulatory control.

--The National Science Foundation provides funding for research organizations which make marine ecosystems analyses. Research is performed primarily to obtain basic information rather than to solve specific problems.

--The National Oceanic and Atmospheric Administration performs intensive analyses in the New York Bight area where about 80 percent of all ocean disposal of municipal sludge and industrial waste occurs. These analyses are used as a basic framework for understanding the effects of ocean dumping on living marine resources.

Research is carried out on the assumption that, once sufficient information exists, developing policies and programs for insuring the protection and high natural production of fish will be possible.

RESTORING FISHERY RESOURCES

Major Federal programs to restore fishery resources are concerned with anadromous fish, primarily salmon. The Congress recognized the seriousness of the dwindling anadromous fish stocks and enacted the Anadromous Fish Conservation Act of 1965 (Public Law 89-304) to conserve, develop, and enhance this resource through financial grants to States. The grants are used to increase States' fishery research capabilities and to expand State fish production facilities, such as fish hatcheries.

More recently, the Congress recognized the importance of the resource in Public Law 94-265, by providing the United States with exclusive management authority over all U.S.-spawned anadromous fish to the extent of their range in and beyond the fishery conservation zone, except in recognized territorial waters of foreign nations.

Three Federal agencies administer major anadromous fish habitat programs. NMFS and the Fish and Wildlife Service administer the Anadromous Fish Conservation Act of 1965 as well as other anadromous fish restoration programs. In fiscal year 1976, NMFS and the Fish and Wildlife Service budgeted about $6 million and $11 million, respectively, for various anadromous fish restoration projects. These include cooperative projects with the States to construct, operate, and maintain fish hatcheries; improve fish migration routes that have been impeded by dams; and other restoration efforts.

The Forest Service also has a fish habitat management program designed to increase anadromous fish populations. The Forest Service has a special interest in anadromous fish, because about two-thirds of the species are spawned in streams crossing Federal lands managed by the Forest Service. Research to provide information needed for improved fishery management comprises the largest part of the Forest Service's program. At the time of our review the Forest Service was studying a plan to conduct a 5-year habitat management study estimated to cost $17 million.

Projects for restoring anadromous fish resources have been successful. The Fish and Wildlife Service estimates that its expenditure of approximately $11 million will result in economic values of $50 million from commercial fishing and $360 million from recreational fishing. The NMFS Columbia River program has restored salmon and steelhead trout production to about 15 million pounds annually, worth about $37 million to the Nation's economy.

PROVIDING FINANCIAL SUPPORT SERVICES TO FISHERMEN

NMFS has three major types of financial assistance programs: direct loans, guaranteed loans, and Federal tax deferrals.

NMFS is authorized to make direct loans, not to exceed $20 million, to finance fishing vessels and gear needed by fishermen unable to obtain commercial loans at reasonable rates. In 1973 a moratorium was placed on the loan fund to provide time to replenish the fund through loan collections and to redirect its use. Because of this, in June 1976 outstanding loans totaled only about $2 million.

In a prior report, we suggested that the Congress should consider amending legislation to establish priorities for using the loan fund. 1/ NMFS has drafted proposed legislation which would authorize the Secretary of Commerce to prescribe conditions for making loans from the fund; however, there is no mention of specific priorities. The legislation proposed would increase the authorization from $20 million to $50 million.

1/"Action is Needed Now to Protect Our Fishery Resources," GGD-76-34, February 18, 1976.

Under another loan program, NMFS guarantees up to 75 percent of commercial loans to fishermen for vessel construction or reconditioning. NMFS charges fishermen a fee for this service, and the fees are used to cover losses resulting from defaulted loans. Total loans outstanding under the program may not exceed $50 million (increased from $25 million in May 1976). In August 1976 outstanding guaranteed loans totaled about $12 million, an additional $6 million in loans had been approved but not finalized, and loan guarantee applications of about $19 million were pending.

NMFS' third major financial assistance program offers a Federal tax deferral for commercial fishing vessel operators. The purpose of the program is to facilitate the industry's capital replacement and expansion reserves. The program allows U.S. citizens who own or lease fishing vessels to defer Federal income tax on all or a portion of the income earned by their vessels. To participate in the program, fishermen must enter an agreement with NMFS and deposit the income--on which tax is deferred--into a special fund. The amount deposited must be eventually spent for constructing, reconstructing, or acquiring commercial fishing vessels. Through June 1976, over $75 million had been deposited, and about $370 million was expected under outstanding agreements.

The Office of Management and Budget questioned the appropriateness of NMFS' financial assistance programs benefiting only one segment of the economy. The Office therefore opposed the NMFS fishing financial assistance programs and indicated that the programs should be terminated or deemphasized.

Three other Federal agencies provide financial assistance to the fishing industry. The Economic Development Administration provides financial aid to States and local areas to encourage long-range industrial and commercial growth. When assistance is unavailable from other sources, the Administration carries out four major programs having an effect on the fishing industry. The basic purposes of the programs are as follows:

--Assist private industry to expand or locate new facilities in areas of the Nation generally burdened with high unemployment or low family income.

--Provide special economic development and adjustment assistance to help States and local areas meet needs arising from actual or threatened severe unemployment resulting from changes in economic conditions.

--Help provide public works and development activities needed to attract new industry and encourage business expansion.

--Provide information and expertise in evaluating or shaping specific projects and programs for economic development.

Each of these programs assisted the fishing industry in fiscal year 1975. Total expenditures for fishery-related projects totaled about $2.9 million, nearly 4 percent of the Administration's budget for the four programs.

The Small Business Administration makes loans to eligible recipients in the fishing industry. Regular business loans, as well as disaster recovery loans, are available.

The following table shows the Administration's fiscal year 1975 loans to the various components of the fishing industry.

Industry component	Number of loans	Amount
Fishermen	118	$ 926,960
Manufacturers	16	2,140,900
Wholesalers	19	1,468,650
Retailers	64	2,002,010
Total	217	$6,538,520

Fishing industry firms are also eligible for financial assistance provided by the Farmers Home Administration, Department of Agriculture. This agency provides loans to entrepreneurs interested in developing businesses and industries in rural America. In fiscal year 1975 the Farmers Home Administration loaned about $2 million to fishing industry firms located in rural areas.

NMFS' position is that the assistance programs are mandated by legislation and are justified because the fishing industry is capital intensive and generally unable to finance needed vessels and gear over a period commensurate with their useful life. NMFS also points out that the fishing industry is inherently unstable, being economically dependent on such factors as the weather, fisheries resource fluctuations, and food product demand abberations. For these reasons, and because of capital expenditures that will be necessary to achieve full domestic use of fishery resources within the extended fishing zone, NMFS rigorously defends continuing its financial assistance programs.

DEVELOPING FISHERIES

NMFS' programs have helped to overcome problems in developing fish resources. The programs have assisted States to develop their commercial fisheries, have helped industry develop new harvesting and processing techniques, and have educated consumers about the nutritional value of fish products.

NMFS' programs include increasing supplies through developing underutilized fishery resources and increasing productivity through improved harvesting, processing, and marketing of the traditional resources. Activities include resource assessment, exploratory fishing, gear development, product and processing research, marketing services, industry and consumer education, and economic analysis to guide industry investment in developing latent fishery resources.

Resource assessments, coupled with information from commercial fishery interests, provide information on fisheries offering potential for commercial development. Exploratory fishing, including gear development, provides specific information on species identified for development.

Product and processing research is geared toward (1) developing new product forms, such as minced fish blocks, to better utilize the resources, (2) improving transportation and storage of fish products, and (3) improving processing methods. Marketing services and industry and consumer education complement industry's attempts to introduce new fish species and products to domestic and foreign markets. NMFS's economic analysis gives industry a basis for establishing fishery development priorities and investment alternatives.

Under authority of the Commercial Fisheries Research and Development Act of 1964 (Public Law 88-309), NMFS helps States develop their commercial fisheries by distributing funds which reimburse up to 75 percent of the costs associated with research and development projects. In past years many of these projects have benefited only local groups; however, NMFS presently is encouraging States to engage in broadly based management projects. Also, past projects have been primarily concerned with developing new markets for established fisheries; NMFS is currently redirecting its efforts to projects for underutilized fish species.

NMFS encourages growth in the fishing industry by participating, on a cost-sharing basis, with industry to develop underutilized fisheries. For example, exploratory surveys showed that large quantities of sable fish were

located in deep waters but could not be harvested with conventional fishing gear. Consequently, NMFS and industry jointly developed a harvesting device for catching and better utilizing the fish.

NMFS and the fishing industry also cooperated in a study in the Gulf of Alaska and the Bering Sea to determine the feasibility of developing a groundfish fishery. This study indicated that the incidental catch of undesired species could be minimized, while successfully catching the target species, through the use of specially designed fishing trawls. The same study identified for industry the fish processing requirements necessary to insure a safe and palatable product acceptable to consumers.

NMFS' education program helps to develop fisheries by informing consumers of the availability, best uses, and nutritional value of underutilized fish. The program is conducted in cooperation with the fishing industry. NMFS proposes national education to be conducted primarily by industry, using information developed by the Federal Government. The program would enable consumers to make informed choices among fish products offered for sale.

INSPECTING FISH PRODUCTS

Seafoods are highly perishable products, and unless properly preserved, processed, and stored, they are subject to a loss of quality and contamination. The Food and Drug Administration inspects food products--including seafoods--to insure that the products are safe, pure, and wholesome. Under a Memorandum of Understanding with the Food and Drug Administration, NMFS also conducts a program for inspecting fish products.

A basic difference between the inspections of the two agencies is that the Food and Drug Administration's inspections are mandatory and NMFS' inspections are voluntary, being fully supported by participating fish processors. Three percent of the fish processing plants and 30 percent of fish products processed in the United States are inspected under NMFS' voluntary program. Under the program, packaged products are marked to let the consumer know that the processing plant and the product were inspected. The marks indicate that (1) the product was packed in a plant using appropriate processing methods and (2) additional tests were applied to indicate the product's relative quality. A grade A mark, for example, indicates that the fish product is of superior quality.

NMFS believes that there should be a mandatory inspection program for fish products because all other types of food containing animal protein are produced and marketed under legislated programs which insure the wholesomeness of the food products.

ENFORCING FISHING LAWS

The Coast Guard is responsible for enforcement operations. The Coast Guard currently carries out aircraft flights and cutter patrols in known active fishing areas off U.S. coasts--mainly within 12 miles. NMFS assists the Coast Guard by providing personnel with fisheries expertise.

Coast Guard enforcement has been hampered by a lack of surveillance aircraft and vessels. Coast Guard officials told us that foreign vessels faced little risk of being apprehended for violating U.S. laws because they could operate in vast areas without being detected. Although the Coast Guard concentrates patrol activities in fishing areas where there is a high probability of foreign fishing, the Coast Guard's presence in these areas is spread very thin. For example, only two or three cutters are assigned to patrol the active fishing areas off the east coast of the United States and a similar number of cutters are assigned off Alaska.

Penalties for violating U.S. fishing rights have become more severe but have not been an effective deterrent. In the 1960s foreign fishing violators were usually fined less than $10,000. During the 1970s the amounts of the fines steadily increased, reaching a high point of $600,000 in 1975. During the same period the number of known violations likewise increased and reached a high point in 1975.

Fisheries law enforcement costs have risen steadily, and greater increases will be required for enforcement under the extended 200-mile fisheries conservation zone. The Coast Guard spent approximately $7.4 million for enforcement in fiscal year 1970. By 1975 the amount had grown to about $36 million, a 386-percent increase. The Coast Guard initially estimated that an additional $143 million would be required to enforce the extended fisheries zone. The cost of cutters and aircraft needed was estimated to be $87 million, and annual operating costs were expected to increase by $56 million. On the advice of the Office of Management and Budget, however, the Coast Guard is developing a plan to enforce U.S. fishing laws under the constraints of a $43 million budget, most of which would be used for needed cutters and aircraft.

FEDERAL LEGISLATION

Federal laws that significantly affect the U.S. marine (ocean) fishing industry are many and varied, scattered throughout several titles of the United States Code. These laws are administered by several Federal departments and agencies in the implementation of the various programs discussed in this chapter. The laws administered by these departments and agencies range from those designed to protect the fish to those designed to protect the fisherman, the declared policy apparently being to protect and promote the fishing industry. The laws are broken down into the following categories, which are discussed and analyzed in appendix II: (1) management and regulation of fisheries, (2) Federal assistance and (3) enforcement and sanctions. Areas for which the Congress might want to consider legislative changes or modification are contained in the appendix.

CHAPTER 7

STATUS OF MAJOR FISH STOCKS AND OPPORTUNITIES TO EXPAND THE U.S. HARVEST

Almost a fifth of world's marine fisheries resources are located within 200 miles of the U.S. coasts. In addition to the United States, about 15 foreign countries are fishing or have fished in this area. The National Oceanic and Atmospheric Administration reported that 970 foreign fishing and fisheries support vessels were sighted off the U.S. coasts in June 1976. (See app. V.) During 1970-74 the catch by foreign countries exceeded that of the United States. The foreign catch in 1974 was about 2.8 million metric tons (6.2 billion pounds). Displacing foreign fishermen from or sharply reducing their catch quotas within 200 miles of the United States would offer opportunities to increase the U.S. harvest. Because a number of fish species are depleted or threatened by depletion, it is possible that, even if this was done, U.S. fishermen would also have to reduce their catch or be prohibited from catching certain species until such time as the stocks have had a chance to be built up to a level to insure perpetuation of the stocks.

Resources important or potentially important to the U.S. commercial fishing industry consisted of the following groupings of species which accounted for over 80 percent of the volume and almost 90 percent of the value of the 1974 U.S. harvest.

Individual species:

clams	herring	salmon
crabs	lobsters	scallops
halibut	menhaden	shrimp
	oysters	tuna

Groundfish:

Atlantic--including cod, flounder, haddock, hakes, pollock, ocean perch, butterfish, croaker and scup.

Gulf--including snappers and groupers.

Pacific--including cod, founder, lingcod, ocean perch, pollock, rockfishes and sablefishes.

Some of the species have been depleted, are threatened with depletion, or are not being fished at or near their sustainable level.

In addition to the groupings shown above, there are a number of underutilized species which are not commercially used at all or only partially used by U.S. fishermen exclusive of those included in the groundfish grouping. Some species which are underutilized by U.S. fishermen are harvested extensively by foreign fishermen and are depleted or threatened with depletion, such as pollock and Pacific hake.

In this chapter, we discuss the status of these species and identify what, in our opinion, are the opportunities to expand the harvest of these stocks. The opportunities include

--restoring the stocks through effective management,

--developing underutilized species, and

--displacing foreign fishing off the U.S. coast.

Although we did not make an indepth study of aquaculture, we point out that, for certain species, aquaculture presents an opportunity to expand the harvest. (See app. III..)

CONDITION OF FISH STOCKS

Clams

Status of the stock

Landings of surf, hard, soft, and other clams in 1975 were 111 million pounds valued at a record $41 million.

Almost all of the U.S. clam production comes from New England, Middle Atlantic and Chesapeake Bay areas. Lack of management controls, insufficient data on resource assessment, and pollution have been problems affecting clam resource availability.

In 1975 the National Marine Fisheries Service estimated the surf clam maximum sustainable yield to be about 70 million pounds. Landings during 1973 through 1975 exceeded this amount. The highest landings were made in 1974 when 96 million pounds were recorded.

An MSY has not been established for the hard clam resource. However, a State fishery official believes that the

resource is being harvested at sustainable levels. More resource assessment is needed and would aid in management of the fishery.

In Maine, which accounted for about 75 percent of the soft clams in 1975, there is no established MSY for the resource, but a State official believes that the resource is being fished at about the sustainable level possible with current harvesting gear.

Pollution represents the greatest threat to hard and soft clams. In the two leading hard clam producing States, about 25 percent of the clam flats are closed because of pollution. About 21 percent of the flats of the leading soft clam producing State are closed because of bacterial pollution. Pacific coast clam production is small; however, significant clam resources exist off the coasts of Alaska and Washington which are underutilized.

Opportunities for expanded harvest

Opportunities to increase the harvest of clams include the development of underutilized species and aquaculture.

Potential for increases in the current clam fisheries and development of new ones in Alaska and Washington is significant. Although the true sustainable yield of Alaskan clams is unknown, a University of Alaska study estimates the yield to be about 50 million pounds per year. The maximum catch in Alaska has only been one-tenth of that amount and in recent years has not exceeded 1 million pounds. The availability of the resource, however, is limited by (1) the number of beaches certified safe for clam harvest and (2) the little knowledge existing about the size and location of stocks and the many biological characteristics needed for effective planning for resource utilization.

A State of Washington survey estimates that there are 100 million pounds of subtidal hard shell clams in the Puget Sound region; however, only a few million will be available for commercial harvest. Many clam beds identified will not be harvested because the ocean floor may be unsuitable to mechnical harvesting, the water may be too deep or too rough for existing gear, or the clam beds may be closed because of pollution.

Another Washington survey indicated that over 100 million geoduck clams existed in the intertidal zones of Puget Sound. Fairly extensive soft shell clam beds also occur at the mouth of several rivers in the Pacific Northwest.

The ocean quahog, another underutilized clam resource, is distributed along the Atlantic coast from Maine to North Carolina. Although landings have averaged less than 2 million pounds per year, NMFS estimates of MSY show a potential yield of 70 to 100 million pounds per year.

NMFS analysis of clam aquaculture indicates that at least six species have potential for aquaculture, but only the eastern hard shell clam is cultured using the sophisticated oyster culture methods. Production of clams by aquaculture could be increased from 2.6 million pounds to an estimated 25 million pounds by 1990 if adequate seed could be produced in hatcheries and if methods can be developed for culture of juveniles to field planting size.

The availability of clam resources is dependent on the quality of the environment. Interim solutions to the problems caused by pollution include transferring clams exposed to pollution to clean waters or depuration plants, as an interim measure, which would permit clams to purify themselves. Ultimately, the solution is effective pollution abatement.

Crabs

Status of the stock

Commercially important crab fisheries include blue crabs of the Atlantic and gulf coasts; king and tanner crabs, which are caught exclusively off Alaskan shores; and dungeness crab, which is caught off nearly the entire Pacific coast.

Landings in 1974 of hard blue crabs were 142.5 million pounds. The Chesapeake Bay and Gulf of Mexico States were the leading producing areas.

The supply of blue crabs is not stable. There is insufficient research information to determine whether the fishery can be maintained through conservation at any particular level of abundance or whether the yield is determined solely by natural factors. It is known, however, that the resource is environmentally sensitive and fluctuations in the resource can be created by pollution. NMFS biologists believe that resource assessment data for the gulf is insufficient to make a quantitative evaluation of the status of stocks.

The Pacific crab catch in 1975 was 162.2 million pounds, worth $61.5 million. The 1975 catch was 15.5 million pounds less then the 1974 catch, but the value was $734,000 greater than the 1974 value. The 1975 catch of king crab--100 million pounds--was the highest since 1968. The rise in the

king crab catch since 1969 indicates that the resource is recovering from overfishing of past years. The tanner crab fishery has developed rapidly over the period of 1968-75, with landings increasing from 3.2 million pounds in 1968 to the record catch in 1974 of 64.1 million pounds before dropping back to 46.2 million pounds in 1975. The dungeness crab catch in 1975 was 16 million pounds, valued at $10.3 million. The 1975 catch, along with the 1974 catch of 16 million pounds, indicates a stabilization of the declining dungeness crab catch that has occurred since 1970.

According to NMFS, the king and dungeness crab fisheries are currently under intensive use and the tanner crab fishery is underutilized.

Opportunities for expanded harvest

The tanner crab in the eastern Bering Sea is the only Pacific Coast crab species with expansion potential. According to NMFS survey results, the tanner crab potential appears good because of the large populations. NMFS believes that the current abundant levels of tanner crabs can continue to support present catch levels and is sufficient for expansion.

According to an NMFS planning document, a number of underutilized crab species, such as red, jonah, and rock, offer some potential for expansion in waters off the Atlantic. The subtainable yield of the resource is unknown.

Groundfish

Status of the stock

Atlantic--Major Atlantic commercial groundfish species include cod, flounder, haddock, hakes, pollock, ocean perch, butterfish, croaker, and scup. Heavy fishing pressure by both U.S. and foreign fishermen during the 1960s and early 1970s resulted in major declines in groundfish abundance. Off the New England coast the resource is estimated to have declined 45 percent between 1963 and 1972.

Foreign fleets have caused or contributed to the depletion of species, such as haddock and yellowtail flounder stocks and reduced abundance in stocks of cod, ocean perch, and lower value species, such as red hake and silver hake. Preliminary data shows that foreign fleets harvested 363.8 million pounds, or 60 percent, of the 602.3 million pounds of major Atlantic groundfish caught in 1974.

Pacific--The major Pacific coast groundfish species of commercial interest or potential commercial interest include cod, flounder, hakes, lingcod, ocean perch, pollock, rockfishes, and sablefishes. NMFS estimated that stocks of Alaska pollock (Bering Sea stock), yellowfin sole, yellowtail flounder, and some stocks of Pacific ocean perch and rockfishes are depleted. Also, some stocks of sablefish and Pacific hake and other stocks of flounder are intensely fished.

Foreign fishing has targeted on Pacific hake, Pacific ocean perch, black cod, Alaska pollock and other groundfish in the Bering Sea and Alaska. U.S. fishermen land very little Pacific hake and almost no Alaska pollock. During 1974 the Pacific groundfish harvest was 5.75 billion pounds, 97 percent of which was caught by foreign fleets.

Gulf of Mexico--The commercially important groundfish species in the Gulf of Mexico are snappers and groupers. The trend in U.S. landings of snapper/grouper has been declining since 1965. Snapper landings have declined from 15.9 million pounds in 1965, to 11 million pounds in 1973. Grouper landings have shown the same trend, declining from 9.9 million pounds in 1965 to 6.6 million pounds in 1973. In addition, recreational fishing for snapper/grouper yielded an estimated 82.7 million pounds in 1970. Also, in 1971-75, Cuban vessels fishing off Florida harvested from 3.5 to 5 million pounds per year.

Little information is available on the snapper/grouper stocks, and no estimates of MSY have been made. The steady decline in commercial catch indicates resource problems related to increased fishing pressure by commercial, recreational, and foreign flag fishermen. The incidental catch of snapper by vessels trawling for shrimp may also have an impact on the declining fishery by reducing the abundance of young snappers.

Opportunities for expanded harvest

Significant potential exists for increased harvest by U.S. fishermen through restoration of depleted stocks, a displacement of foreign fishing and exploitation of underutilized stocks.

--The long-term estimate of MSY for groundfish off the Atlantic coast from Maine to Cape Hatteras, North Carolina, is 774 million pounds. If resource availability is increased through effective management to levels approximating MSY, and foreign fishing effort is displaced, about 536 million pounds over the 238 million pounds landed in 1974 would be available to U.S. fishermen.

--Large stocks of underutilized groundfish exist in the Gulf of Mexico. As an example, croaker and mullet, with estimated MSYs of over 500 million pounds and 150 to 200 million pounds, respectively, are virtually underutilized and have high potential for expansion and development.

--Opportunities exist for increasing the U.S. harvest of Pacific groundfish through displacment of foreign fishing, development of underutilized species, and stock restoration. As an example, the Bering Sea Alaska pollock stocks are depleted as a result of heavy foreign fishing; the foreign harvest in 1974 was 2.5 billion pounds. A significant reduction in fishing effort is required to allow the stocks to rebuild. Such a reduction and eventual displacement of foreign fishing could increase the stocks of pollock available to U.S. fishermen for development.

Halibut

Status of the stock

According to NMFS, the halibut stocks in the northeast Pacific and Gulf of Alaska are depleted and the stock in the Bering Sea borders on depletion or is in imminent danger of depletion. However, the International Pacific Halibut Commission officials have stated that the halibut stock in the Bering Sea is also depleted, and actually in poorer condition than the Gulf of Alaska stock. The U.S. landings of halibut have declined from a high of about 60.7 million pounds in 1954 to approximately 18.5 million pounds in 1974. Industry, government, and Halibut Commission officials attribute the decline in U.S. halibut landings to overfishing and to the incidental catch made by the Japanese and Russian vessels trawling for target species such as black cod, pollock, and ocean perch. The 1975 season indicated some improvement in the halibut stock, i.e., the 25-million pound quota established by the Halibut Commission for the northeast Pacific and the Gulf of Alaska was reached, the catch per unit of effort increased, and the abundance of juveniles in the Bering Sea increased.

Opportunities for expanded harvest

The principal opportunity to increase the halibut catch is through restoration of the stock. By effective management, resource availability may be increased. Management efforts must be directed to limiting the incidental catch of halibut which has reduced the number of juveniles entering the fishery.

Herring

Status of the stock

Sea herring stocks in the Atlantic are depleted. During 1975 the total catch in the Atlantic off U.S. waters was 360 million pounds, of which U.S. landings were 80 million pounds, or about 22 percent, of the total catch.

In 1975 U.S. herring catch in the Pacific, according to preliminary statistics, was 40 million pounds, valued at $2.9 million. A 1972 NMFS report stated that the catch of Gulf of Alaska herring was considerably less than the maximum sustained yield of 500 million pounds. Estimates of herring population off the California coast indicate that the resource may be underutilized.

Opportunities for expanded harvest

Herring resources off the Atlantic coast, while seriously depleted, are large enough to allow increased utilization by U.S. fishermen through displacement of foreign fishing and restoration of the stock. The estimated sustainable yield of a restored herring stock within 200 miles of the United States is from 300 to 500 million pounds.

Additionally, herring stocks of the Pacific, primarily of the Gulf of Alaska, are currently underutilized by U.S. fishermen and represent an opportunity for expanded harvest.

American lobster

Status of the stock

Landings of American lobsters in 1975 were 29 million pounds valued at $49.1 million. Inshore landings have generally declined since 1960, while offshore landings peaked in 1970.

The American lobster is seriously overfished, resulting in depletion throughout its inshore range (within the 12-mile fisheries zone). A study in one State concluded that nearly all available legal-sized lobsters are caught each year. Research has indicated that current mortality rates are too high and minimum sizes are too low in all areas.

While stock assessments have not been sufficiently complete to establish a MSY for the inshore fishery, NMFS officials believe that the inshore MSY is conservatively estimated to be between 25 to 30 million pounds. As a result of

the depleted state of the stock, landings in the inshore area have declined despite a substantial increase in effort. Biologists estimate that the MSY for the inshore fishery from Maine to North Carolina could be taken with about 1 million pots. In 1975 preliminary data indicates that there were 2 million pots--or double the capacity needed.

Although a precise MSY cannot be established for the offshore stocks because of inadequate catch statistics, NMFS officials believe that catches have been within the fishery's sustainable limits.

Opportunities for expanded harvest

Based on available information, NMFS and State biologists believe that lobster stocks can be better protected and supplies increased substantially through implementation of a comprehensive management program. The essential elements of management would be a uniform legal size greater than that currently existing in all the States and control of fishing effort.

Although unlikely in the near future, the development of a technically and economically feasible aquaculture system could increase lobster production.

Spiny lobster

Status of the stock

Spiny lobsters are found in the Atlantic from North Carolina to Brazil and in the Pacific from Southern California to South America. The spiny lobster is subject to intensive fishing. Total landings in 1975 were 7.7 million pounds, of which landings in the State of Florida were 7.5 million pounds. Of the total Florida landings, approximately 5.5 million pounds were harvested from domestic waters and 2 million pounds from foreign waters. The trend in Florida landings from 1953 to 1973 was generally upward. The increases were largely due to the harvest landed from the Bahamian fishery which was closed to U.S. fishermen as of August 1, 1975, by the Bahamian Government. (See p. 100.)

Opportunities for expanded harvest

Declines in the yield per unit of effort of the spiny lobster indicate little hope for expansion of the fishery. Other factors which limit the potential to increase or maintain previous levels of harvest include:

--There are no known commercial-size stocks not being exploited.

--Negotiations to regain access to the lobster fishery in Bahamian waters have been unsuccessful.

Menhaden

Status of the stock

The predominant species are the Atlantic and Gulf of Mexico menhaden. The Atlantic menhaden has been fully exploited and will not sustain past levels of fishing effort. Annual landings in the Atlantic have shown a classic response to a developing fishery. Landings increased fairly steadily to a peak in 1956 and then declined as the harvesting rate exceeded the growth rate of the menhaden population. The population and landings have recovered significantly since the low catch of 390 million pounds in 1969. Landings in 1975 were 605.7 million pounds.

NMFS officials believe that fishing effort is about 25 percent greater than that required to harvest the estimated MSY and great enough to damage the resource and impair its ability to sustain itself.

The record catch of gulf menhaden in 1971 was over 1.6 billion pounds; but, landings have since declined but no trend is indicated. In 1975 the catch amounted to 1.2 billion pounds.

NMFS has concluded from completed studies and analyses that the gulf menhaden resource is healthy and producing an annual catch that is considered sustainable. The latest MSY estimate for the gulf menhaden is 1.09 billion pounds. Using an 80-percent statistical confidence level, the upper MSY limit is 1.18 billion pounds.

Opportunities for expanded harvest

The history of the Atlantic menhaden fishery shows that overfishing will occur, followed by years of reduced abundance, without a management program. NMFS believes that, with effective management, the annual production from the Atlantic can be increased to about 880 million pounds. Possible solutions that would directly benefit the resource are:

1. Reduce the fishing effort and catch substantially throughout the fishery in 1977.

2. Continue a reduced catch and effort program for several years until the resource shows positive signs of recovery. After that, gradually increase the catch and effort at a rate that is in concert with the rebuilding of the resource.

3. Do not catch juvenile menhaden during or after the recovery period.

The gulf menhaden fishery may experience the same cycle if not properly managed. NMFS has concluded from studies of the gulf menhaden fishery that significant expansion in landings and fishing effort is not suggested by the information and analyses available. However, maintenance of the existing gulf fishery is dependent on adherence to an established management program.

Because menhaden are dependent on estuaries for development, the quality and quantity of estuarine habitat must be assured.

Oysters

Status of the stock

Commercially important oysters are the eastern oyster which is harvested from Massachusetts to Texas, principally in the Chesapeake Bay and the Gulf of Mexico; and the Pacific and western oysters harvested in waters off the Pacific coast from California to Alaska.

Total oyster landings have steadily declined. Atlantic landings averaged about 50 million pounds per year in the 1950s but declined to an average of 28 million pounds per year in the 1960s and 1970s. In the gulf, landings during 1975 were 19.6 million pounds which approximate the annual landings of the 1960s. On the Pacific coast, landings have steadily declined from the 12.3 million pounds in 1959 to about 3.7 million pounds in 1975.

Factors which affect oyster production include:

--Natural changes to the environment, such as floods, which affect the salinity of the water (a critical factor in oyster survival) and diseases.

--Bacterial and industrial pollution, which, as an example, has resulted in the closure of 33,000 acres of bottom suitable for oyster production in Louisiana.

--Availability of seed oysters.

--Obstacles to increased investment in private beds, such as the high risk of loss due to floods, pollution, disease, and predators.

Opportunities for expanded harvest

Opportunities to increase resource availability include enhancement of oyster grounds, aquaculture, and seed hatcheries.

Increases are possible from relaying; that is, regularly taking oysters from poor growing areas and placing them in more suitable environments, cultivating and designing reefs, controlling pollution, controlling diseases and predators, preventing undesirable ecological changes, and promoting conducive ecological changes. NMFS estimates that, by adopting aquaculture methods used in other countries, U.S. oyster production could be increased by 80 million pounds (meat weight) by 1985. Increased development of State and private oyster seed hatcheries would offer an opportunity for selective breeding and improvement of the basic oyster stock.

Salmon

Status of the stock

The five species which make up the Pacific coast salmon fishery are the chinook, chum, pink, coho, and sockeye salmon. In 1975 landings of Pacific salmon were 201.6 million pounds worth $116.3 million. The pink and chum salmon accounted for about 45 percent of the 1975 commercial landings. Sockeye salmon accounted for about 26 percent, but is considered the most valuable for canning purposes. The chinook and coho salmon are the least abundant of the species, but are the object of important commercial troll and sport fisheries.

According to NMFS, salmon resources are, for all practical purposes, fully utilized but some stocks are depleted. U.S. landings of Pacific salmon in 1975 were 76.8 million pounds below the 1970-74 5-year average of 278.4 million pounds. The causes for decline vary from one area to another; however, major reasons for the decline are overfishing, inadequate management, habitat degradation, adverse climatic conditions, and foreign fishing. Alaska and Washington have implemented limited entry systems in the salmon fishery.

Opportunities for expanded harvest

The annual yield of salmon stocks can be increased through various enhancement, aquaculture, and rehabilitation programs. The salmon resource can be increased by constructing hatchery systems to incubate, hatch, and grow young salmon. Rehabilitation programs can add to the fishery by reestablishing or increasing natural salmon runs. Maintenance, protection, and improvement of the present freshwater habitat will provide for increased salmon production. This can be done by improving spawning grounds, facilitating passage over dams and other obstacles to migration, clearing spawning channels, and placing environmental controls on pollution and alteration of inland rivers and streams.

Scallops

Status of the stock

Sea, bay, and calico scallops, commercially harvested by the United States, declined from 22.8 million pounds in 1965 to 13 million pounds in 1975.

The Atlantic sea scallop, the most commercially important in the United States, is considered by NMFS to be at a relatively low level of abundance. NMFS officials believe that the Georges Bank resource is being overfished, primarily by Canadian fishermen. They also believe that many scallops are harvested at sizes much smaller than the size producing the maximum meat yield.

The status of the Alaska sea scallop is not clear, but it appears that catches may not increase significantly above present landings of under 2 million pounds per year.

Bay scallop landings have generally ranged between 1 and 2 million pounds annually; substantial increases are not expected.

Calico scallops are presently underutilized.

Opportunities for expanded harvest

Opportunities for increasing the harvest of scallops exist through the restoration of sea scallop stocks and expansion of the calico scallop fishery.

NMFS biologists have concluded that the yield of sea scallops can be increased by postponing the harvest of young scallops (small) for a few more years.

Although no MSY has been established for calico scallops, an NMFS official estimates that it is probably many times the annual landings which has fluctuated widely, up to 1.9 million pounds in 1966.

Shrimp

Status of the stock

Shrimp resources of the United States are distributed along the Atlantic, Gulf of Mexico and Pacific coasts. Landings in 1975 were 343.6 million pounds and were valued at $226.2 million.

In 1975 the Gulf States accounted for 49 percent of the total U.S. landings and 79 percent of the value. Historically, the gulf has provided over 76 percent of the landed value of U.S. shrimp. Opinions among NMFS officials vary as to the status of the gulf shrimp stock. Some officials believe that data is insufficient to make estimates of the biomass or to establish an MSY while others believe that the fishery appears to be operating at or near the MSY. Existing harvesting capability in the gulf appears to exceed that needed to harvest the available resources. Shrimp landings over the last 11 years or so have been essentially constant. The catch per unit of effort has decreased, which indicates more intensive effort for the relatively constant level of the shrimp biomass.

The 1975 shrimp catch in the Pacific was 136.9 million pounds valued at $14.5 million. In 1975, for the fourth consecutive year, Alaska led the Nation in volume with 98.3 million pounds.

The principal shrimp fisheries in the Atlantic are located off the coasts of Massachusetts, New Hampshire, Maine, North Carolina, South Carolina, Georgia, and Florida. The combined landings of northern and southern shrimp in 1975 amounted to about 36.6 million pounds valued at $33.4 million.

Shrimp stocks in the northern Atlantic are depleted. Total landings have decreased and there are indications of decreases in the catch per unit of effort and size of shrimp landed. Stock depletion of the northern shrimp is directly related to an intense buildup of fishing effort. In 1967 there were 89 vessels in the fishery, while in 1972 the number increased to about 400. The increase in fishing effort and

the decline in stocks indicate excess harvesting capacity in the fishery. Some biologists believe that environmental factors have also contributed to the decline of the northern shrimp.

The southern Atlantic shrimp fishery appears to be operating at or near the MSY under present fishing practices. The catch per unit of effort in the South Atlantic is quite low due to the large number of boats and vessels in the fishery.

Some shrimp species of the South Atlantic and gulf, which include royal red shrimp, are underutilized. Research efforts, however, have not shown that sufficient quantities are available for commercial development. On the Pacific coasts, some shrimp resources in Alaskan waters are underutilized.

Opportunities for expanded harvest

Opportunities for expanding the amount of resource available depend on

--implementation of effective management programs to improve the status of currently used stocks,

--increased aquaculture efforts, and

--development of underutilized stocks.

Biologists believe that reductions in landings of the northern shrimp are necessary to permit the stocks to rebuild. The fishery was closed indefinitely in 1976 by the Atlantic States Marine Fisheries Commission. Fishery managers and scientists have identified opportunities for better management of the South Atlantic fishery, such as increasing the age at capture, thus obtaining higher yields. According to NMFS, 15 million pounds of marine shrimp could be produced by aquaculture by 1985, if technology and economic production systems can be developed rapidly.

Although commercial development opportunities for royal red shrimp in the South Atlantic and gulf are limited, this species may, in the future, offer an alternative to fishermen who may become displaced from the present shrimp fishery or other fisheries. Development of underutilized shrimp resources in Alaskan waters is dependent upon harvesting being made economically viable.

Tuna

Status of the stock

The commercially important species of tuna include skipjack, yellowfin, albacore, bigeye, and bluefin. The distribution of tunas occur throughout the tropical and temperate waters of the Atlantic, Pacific and Indian Oceans. As early as 1971, NMFS officials considered stocks of the temperate and tropical species in the traditional grounds to be exploited at nearly their potential maximum. The 5-year trend of U.S. tuna landings during 1970-74 has been upward. The 1975 catch was record 568.2 million pounds, of which about two-thirds were landed in the continental United States and Hawaii and one-third in Puerto Rico. An NMFS official informed us that the increased 1970-75 domestic tuna catch resulted, in part, from a greatly intensified fishing effort by U.S. seiners.

Future sustained catch increases of yellowfin and albacore tuna are not expected in the eastern Pacific traditional fishery. In addition, U.S. fishermen are experiencing increased difficulties in retaining access to traditional tuna fishing grounds in the eastern Pacific because of the growing trend toward extended national jurisdiction over fishing resources.

Opportunities for expanded harvest

According to a 1974 NMFS report, the western Pacific and the Indian Oceans are essentially the only areas where large-scale expansion of tuna catches are possible.

NMFS estimated that the potential annual harvest of skipjack tuna in the western Pacific could range up to 2 billion pounds. With small exceptions, the resource is not utilized by U.S. fishermen. The annual harvest, which in 1974 was 200 million pounds, was caught primarily by foreign flag vessels.

Considerably less information is available on the abundance and distribution of tuna in the Indian Ocean than in the western Pacific. However, according to a Food and Agriculture Organization report, the aggregate potential of the fishery may run as high as 660 million pounds a year; however, knowledge of this resource is fragmentary.

OPPORTUNITIES FOR EXPANDED U.S. HARVEST THROUGH DEVELOPMENT OF UNDERUTILIZED SPECIES

As discussed in the previous section of this chapter, underutilized species offer an opportunity for expanding the U.S. commercial harvest of fish. Species such as anchovy, croaker, and mullet are not fished to any great extent by domestic or foreign fishermen. Species such as Pacific hake and pollock, while fished intensely by foreign nations, are underutilized by domestic fishermen. In addition to those previously mentioned, other species are sufficiently abundant to support an expanded commercial harvest. The following table compares the estimated MSY of selected stocks with the 5-year average U.S. commercial catches.

Species	Pounds		
	5-year average catch		Estimated MSY
	1970-74	1971-75	
	(millions)		
California anchovy (central stock)		222	5,000 to 6,000
Pacific hake (offshore stocks)	0		330 to 550
Atlantic herring (offshore stocks)	37		310 to 485
Round herring		0	330
Atlantic mackeral	4.8		690
Jack mackeral		36.6	120
Alaska pollock (Bering Sea, Aleutians and Gulf of Alaska	0		2,780 to 4,320
Skipjack tuna (central and western Pacific)		(a)	2,205
Atlantic squid (short-fin and long-fin)	3.3		200
Croaker	16.4		500
Mullet	33.1		150 to 200

a/An NMFS official estimated that the annual catch of skipjack tuna in the central Pacific has averaged about 11 million pounds.

Public Law 94-265 encourages the development of fisheries which are underutilized or not utilized by U.S. fishermen. What must be decided is the approach to be followed and the amount of effort to be expended.

Factors hindering development of underutilized species

Although the underutilized fish resources off the U.S. coast provide a large opportunity for expanding the domestic harvest, various barriers exist to commercial development which must be resolved.

As pointed out in our report, "U.S. Fishing Industry Can Be Strengthened By Developing Underutilized Fish Resources" (GGD-75-68, May 30, 1975), the factors involved in developing a new fishery include

--resource assessment,

--harvesting technology,

--handling and transportation,

--product development,

--processing technology, and

--marketing and economic analysis.

Major problems with one or more of these factors usually keep a species out of commercial production.

Resource assessment

Assessment of the resource potential provides general information on what fish stocks are available, in what areas, in what quantities, at what time of the year, and approximates the maximum sustainable yields available.

Harvesting technology, handling, and transportation

Besides knowing where to find the fish, fishermen also need to know the type and quantity of fishing gear that should be used to harvest the resource on a continuing basis. Gear development problems are retarding the development of many species. For example, purse seining, a technique used to catch tuna, is used very effectively to catch yellowfin and skipjack tunas in the eastern Pacific, but it appears that this harvesting technique is not transferable to the western Pacific. The skipjack tuna in the western Pacific exist in very clear water with complex currents. The clear water enchances the chances that the tuna may evade a conventional net, with complex currents hindering the net's sinking rate.

Additionally, the skipjack's movement patterns are hard to predict, making it extremely difficult to position a vessel to drop a net. These characteristics make it difficult to purse seine skipjack tuna.

Some problems occur at both the fishermen and processing levels. For example, mullet, pollock, and Pacific hake deteriorate rapidly and cannot be stored for extended periods under normal fish storage methods. Accordingly, different storage methods must be developed for use on fishing boats and in processors' facilities.

Product development and processing technology

Product development seeks ways to convert raw material into product forms that would be acceptable in the marketplace. Product development on many underutilized species is especially necessary because of their unfamiliar consistency and taste. Much of the processing and handling of fishery products is labor intensive and thus costly. Processing technology research seeks to reduce costs through the use of sophisticated product-handling techniques. NMFS studies show that product development or processing problems are retarding more extensive use of pollock, herring, croaker, and several other species.

Marketing and economic analysis

Marketing services facilitate the introduction of new species or new products into the marketplace--domestic or foreign. Marketing services can include market research, consumer education, and distribution mechanisms. One factor which might limit consumer demand and the establishment of permanent markets, as pointed out in an NMFS planning document, is the name given to a fish species. For example, although cancer crabs, dogfish, and rat tails have a potential for development into viable fisheries, such names could hinder development. The problem stems from the requirement of the Food and Drug Administration that fishery products be labled according to their commonly used names.

Economic analysis is the basis for decisions throughout the fishery development process involving the evaluation of investment alternatives, the establishment of fishery development priorities, providing cost-benefit studies, and reducing risks on the part of the investor.

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Other barriers to commercial development of underutilized species include the common property nature of the resource and the fragmented industry structure which are discussed in chapters 8 and 9, respectively. Examples of problems hindering the expansion of selected underutilized species are presented in appendix III. Some of these problems would be applicable to some extent to all underutilized species.

CHAPTER 8

MAJOR DIFFICULTIES IN MANAGING FISHERIES

As shown in chapter 7, many commercially important species are depleted or are threatened with depletion. The reduced abundance has resulted from domestic and/or foreign overfishing, either directly or incidentally and natural and manmade environmental changes.

Despite the depleted and endangered status of many species, ample resource potential exists to increase the U.S. harvest through restoration of depleted stocks and preservation of endangered species, development of underutilized species, displacement of foreign fishing, and enhancement of the environment and aquaculture.

The long-term success of restoration and development programs in providing a constant supply of fish resources depends heavily on the effectiveness of management efforts, and the extent to which environmental problems are solved and alleviated. In our previous report, "Action Is Needed Now to Protect Our Fishery Resources" (GGD-76-34, Feb. 18, 1976), we pointed out that management efforts have been ineffective in controlling overfishing and that the major difficulties in managing fisheries were the common property nature of the resource, fragmented jurisdication and lack of precise data.

COMMON PROPERTY

Historically, marine fish resources have been viewed as a common property which is available to all who desire to harvest it. This contrasts with most other natural resources where access is limited. For example, commercial use of Federal timber is controlled by a program of competitive bidding as well as by limits on the amount that can be harvested. Another example is the bidding process used for offshore oil exploration.

As commercial harvesting of certain species has become more desirable to domestic and foreign fishermen and access to the fisheries has been uncontrolled, efforts have increased to a level sufficient to deplete the stock. Even if overfishing does not result, more capacity can be attracted to the fishery than is necessary to harvest the available resource. Excess capacity has the effect of

reducing the share of total available revenues to each producer while endangering the fishery with depletion through overfishing.

The common property concept also deters private investment necessary to develop underutilized species. Without ownership or control of the resource, investors could not expect to realize more than a small portion of the economic benefits generated by a developed fishery.

Management of domestic fisheries, in the past, has been primarily directed to conservation rather than conservation and maximum economic return for the fishery. Management tools used include:

--Closed seasons or areas which prohibit fishing when or where the stocks are most vulnerable.

--Limits on the size of certain species designed to increase the annual yield by permitting enough of the species to grow to a larger size to insure that the species have reached a size or age where they can reproduce.

--Vessel limitations, such as size, tonnage, or automotive power restrictions, designed to reduce pressure on the stocks by imposing technological inefficiency.

--Gear restrictions designed for the same purpose as vessel restrictions. In other cases, gear restriction, such as minimum mesh size requirements, are designed to reduce the catch of a species taken incidentally to the target species, or to allow escapement of individuals considered to be too small.

--Limits on catch, which result in the closing of a fishery once the total quota or total allowable catch has been reached.

Measures, such as the above, while designed to conserve the resource, have not resolved the problems inherent in the common property concept. For example, limits on catch, which may achieve and sustain the desired level of catch, can result in economic inefficiency. The eastern Pacific tuna fishery, which is subject to internationally imposed conservation quotas for the harvest of yellowfin tuna, is an example of how overcapitalization occurs in a fishery. Tuna prices rose substantially in the 1960s resulting in excellent profits and encouraging new construction which expanded the U.S. fleet capacity from 41,400 tons to 124,300

tons from 1967 to 1975. Foreign interests were also expanding their fleets. The resulting increase in capacity was substantially larger than required to harvest tuna stocks in the eastern Pacific and led to a 59-percent decrease in the catch per ton of the U.S. fleet capacity between 1967 and 1975.

Systems to limit effort expended in a fishery offer an opportunity to correct economic inefficiencies resulting from the common property concept. The concept of limiting effort should center on conserving resources while improving the economic benefits accruing to producers. Some of the methods available for limiting effort in a fishery include:

--Limiting the number of licenses to be issued.

--Establishing fees based on volume or value of fish landed.

--Establishing quotas on the volume of fish landed.

--Establishing a program to buy back idle vessels.

--Combining two or more of the above.

Systems to limit effort, however, will not displace traditional management techniques required to insure a renewable resource, such as the net mesh size necessary to permit the younger fish to escape, and establishment of seasons and areas and vessel limitations.

In the late 1960s Canada introduced programs to limit licenses in the lobster fisheries on the Atlantic coast and in the salmon fisheries in British Columbia. The primary goal of the program is to increase the catch per vessel and earning capacity of the remaining fleet.

Despite the advantages of establishing property rights, systems to limit effort can create social and economic problems through the displacement of fishermen. Consequently, actions to limit effort require intensive evaluation and review by all affected parties.

Control of foreign fishing efforts in waters 12 to 200 miles off the U.S. coasts has been based on bilateral and multilateral agreements governing certain species in specified geographical areas. These agreements, however, have not been fully effective in conserving the resource.

With the advent of extended jurisdiction created by Public Law 94-265, fish resources in waters within 200 miles of the United States will no longer be considered common property between the United States and foreign nations. Access of foreign nations to fish resources within 200 miles of the United States will be controlled through a permit system.

Public Law 94-265 establishes regional fishery management councils with authority to limit access to fisheries which can serve to remove the common property concept. The effectiveness of limited access schemes, however, may be impeded by a provision which limits the amount of fees required by any management plan to the administrative costs incurred in issuing permits. Licensing systems used by themselves may result in problems similar to those experienced in the British Columbia limited entry system. The system in British Columbia began by limiting only the number of vessels which led fishermen to build bigger vessels. British Columbia then placed a limit on total tonnage which led to heavier investment in sophisticated gear. Thus, total costs continued to increase without commensurate increases in total catch.

FRAGMENTED JURISDICTION

Fisheries off the U.S. coasts are located in three ocean zones: the territorial sea, which extends to 3 miles off the coastline; the contiguous zone, covering 3 to 12 miles offshore; and the high seas or international waters, extending beyond 12 miles. Generally, individual States have jurisdiction over the territorial sea bordering their coastlines which, in some instances, had been delegated to local governing units (cities, towns, counties). In the other two zones, a State may enforce regulations against its own citizens but not those of other States.

The Federal Government has jurisdiction over the contiguous zone, which will be extended from 12 to 200 miles offshore by Public Law 94-265 effective March 1977, and U.S. vessels operating on the high seas. However, except for marine mammals, endangered species, and species covered by international agreements, clear authority to manage U.S. fishing activity in these zones had not been assigned to a specific Federal agency. Fisheries on the high seas are open to all nations. In some instances, certain fisheries are managed through international agreements, but membership in such agreements is voluntary and compliance is difficult to enforce.

Fisheries management is difficult when only one government entity is involved but becomes more difficult when several government entities are involved, particularly when States, cities, towns, and counties desire to protect local interests and political concerns.

According to a National Marine Fisheries Service planning document, the division of jurisdiction between the States and the Federal Government has frequently led to fragmented and inconsistent research, incomplete and inadequate statistical data, and ineffective management programs. Many fisheries' stocks migrate in and out of the jurisdictions of individual States, and inadequate mechanisms for coordinating research and management has led to conflicting, overlapping, and restrictive regulations which impede the economic development of the U.S. fishing industry. The State-Federal Fisheries Management Program, a voluntary effort on the part of States and NMFS, provided a mechanism to resolve problems created by inconsistent State laws but progress has been slow.

Although the regional fishery management councils are responsible for formulating and implementing comprehensive management plans, problems arising from fragmented jurisdiction may not be readily corrected in some fisheries. Based on our interpretation of the act, it appears that fisheries located predominantly in States' coastal waters (0 to 3 miles) would not be subject to regulations issued by the Secretary of Commerce implementing management plans developed by the councils. Species such as oysters, hard and soft clams, and bay scallops, which are harvested predominantly within a State's boundaries, and species which may span or migrate between States' boundaries and, in some cases, beyond 3 miles from shore but are harvested predominantly within 0 to 3 miles, such as menhaden, sea herring, blue and dungeness crabs and American lobsters, would not be subject to the regulations implementing comprehensive management plans. Consequently, jurisdiction may remain fragmented because State regulations for such fisheries may continue to differ in the absence of uniform plans.

LACK OF PRECISE DATA

The first and essential step for effective fisheries management is to obtain data on the status of the stocks, their life cycles, and the effects of various fishing efforts and environmental changes on the stocks.

Although some knowledge exists on the condition of stocks and the interdependence of various species, in most

cases, scientific proof of fishery conditions has not been available. According to NMFS, catch and effort data was considered adequate for only 3 of the 18 species harvested principally by U.S. fishermen in the northwest Atlantic, as shown below.

Adequate data	Preliminary or some data
Menhaden	Bluefish
Oysters	Crabs
Surf clams	Croaker
	Drum
	Hard clams
	Lobster
	Scallops
	Sea trout
	Shrimp
	Spot
	Striped bass
	Summer flounder
	Tuna
	White hake
	Yellowtail flounder

Additionally, there is often a lack of social and economic data necessary to measure the probable effect of a given management decision on the fisheries' participants and local economy. As a result, fisheries managers have been reluctant to make hard management decisions.

Public Law 94-265 requires the Secretary of Commerce to initiate and maintain a program of fishery research. In addition, the regional fishery management councils are required to establish and maintain a scientific and statistical committee to assist in the development, collection, and evaluation of biological, social, and economic data needed to develop and amend management plans.

Because optimum yield is to be the objective of management, the act imposes new biological, social, and economic data requirements. An NMFS official informed us that, in many cases, the biological, social, and economic data needed to achieve the optimum yield objective is lacking and that, in some cases, the techniques required to collect and develop the data do not exist.

ENVIRONMENTAL PROBLEMS

Fish are an environmentally sensitive resource. The pollution of marine waters can affect their existence, through either reducing their ability to reproduce or destroying them outright. In some instances, although their survival is not affected, pollution renders them unsafe for human consumption. Pollution in marine waters results, among other things, from discharges of toxic substances (i.e., arsenic, cadmium, kepone, lead, mercury, and poly chlorinated biphenyls), untreated sewage, heated wastewater from power-generating plants, ocean dumping of sludge, oil spills, and dredging and filling operations.

The physical alteration or destruction of coastal and estuarine areas can adversely affect the Nation's fisheries. NMFS estimates that about two-thirds of the marine fish found in U.S. coastal waters, during some parts of their life cycles, live in coastal and estuarine areas. These areas are increasingly sought for commerce, housing, recreation, power generation, or shipping. Continually converting fish habitats to other uses will have an impact on the size and condition of fish stocks.

It is difficult to estimate the total economic loss to society because of pollution. Yet, a number of instances clearly indicate that substantial economic losses have occurred. For example:

1. Because one-fifth of the U.S. shellfish beds were closed because of pollution, the annual revenue loss in 1970 was estimated by the Council on Environmental Quality to have been $63 million.

2. In Connecticut a combination of pollution and marsh destruction reduced the annual harvest of clams from $20 million during the 1920s to $1.5 million during the 1970s.

3. In Galveston Bay the catch of shrimp declined, even with increased harvesting efforts, from 14.2 million pounds in 1962 to 1.9 million pounds in 1966, because of increased industrial, domestic, and oil pollution.

4. In Raritan Bay, between New Jersey and New York, the current harvest of hard clams is worth $40,000 a year. With clean water, the annual harvest could be worth $3.85 million.

5. In the Chesapeake Bay, over 50 percent of the upper estuarine areas where fish spawned and shellfish were harvested were destroyed between 1800 and 1950 by dredging, filling, and pollution.

6. Adverse publicity on mercury found in tuna in the latter part of 1969 and in early 1970 resulted in national declines in the retail sales of tuna of 37 percent in December 1969 and 42 percent in January 1970. As a result, there was a decline in fishing effort and a net loss in supplies of food products for consumers.

7. The Environmental Protection Agency, in a February 1976 report on the kepone pollution problem in the James River, Virginia, stated that the maximum estimated loss of a total ban on fishing in the James River for a year would be about $7.3 million. Approximately 30 percent of the $7.3 million ($2.2 million) would represent reduced incomes to fishermen. The remaining $5.1-million loss would be widely dispersed among numerous individuals and business firms in the region. Reductions in employment could total between 750 and 775 individuals.

A number of Federal laws have been enacted which, in total or in part, have been concerned with environmental quality. Among the more important are the:

--Fish and Wildlife Coordination Act of 1958, as amended.

--Oil Pollution Control Act of 1961.

--National Wildlife Refuge System Administration Act of 1966.

--National Environmental Policy Act of 1969.

--Federal Water Pollution Control Act Amendments of 1972.

--Coastal Zone Management Act of 1972.

--Marine Protection, Research, and Sanctuaries Act of 1972 ("Ocean Dumping" Act).

--Endangered Species Act of 1973.

Federal, State, interstate, and local agencies have the responsibility to implement the Federal laws. We have found that the laws are not being effectively implemented and coordinated.

CHAPTER 9

BARRIERS TO INDUSTRY EXPANSION AND/OR VIABILITY

For the fishing industry to expand and be viable, maintaining resource availability through effective management is a must. Equally important is the need for

--efficient harvesting techniques and gear,

--efficient processing methods and product development innovations,

--products of high quality, and

--an effective marketing and distribution system.

The operations of the industry--whether in the harvesting, processing and/or marketing sectors--are, in some instances, adversely affected by

--restrictive regulations,

--jurisdictional actions taken by foreign countries over what they consider to be their fish resources, and

--foreign competition.

Because of the high risk nature of the industry, certain economic factors associated with harvesting operations, such as the high costs for vessels, nets and netting and insurance, and the availability of labor, can have a serious impact upon its viability. In addition, the fragmented nature of the industry makes it difficult to accumulate capital and achieve coordination among the operating units.

This chapter discusses some but not necessarily all of the significant barriers or factors which, we believe, affect the ability of the industry to expand and prosper.

HARVESTING TECHNIQUES AND GEAR

Our study showed that although efficient techniques and gear are available in some individual fisheries, i.e., salmon, oysters, clams, their use is sometimes restricted by State regulations. There are instances where innovative techniques and gear need to be developed and used in other individual fisheries, i.e., tuna, shrimp.

Techniques and gear restricted by State regulations

State management of fish resources sometimes includes regulations which restrict the use of certain efficient harvesting techniques and gear.

Salmon

Fishermen from four States (Alaska, Washington, Oregon and California) harvest Pacific salmon. Purse seining and gill netting account for about 88 percent of the salmon catch. California does not permit purse seining or gill netting. Oregon does not permit purse seining. Trolling for salmon is permitted in all four States.

Although Alaska does not restrict purse seining or trolling for salmon on a State-wide basis, it limits the size of seine vessels to not more than 50 feet and trollers to not more than four lines. In some Alaska districts, however, the use of seines is prohibited. Although permitting gill netting, Alaska prohibits the use of monofilament gill nets and, in some districts, the length of gill nets is limited. Washington limits the size of gill nets and purse seines, the number of troll lines, and prohibits the use of monofilament gill nets.

It is difficult to assess the specific impact of these restrictions on the salmon fishery. Generally speaking, however, it has resulted in restraining economic efficiency and the underutilization of gear.

Oysters

On the gulf coast, the capability to harvest oysters is impaired because of restrictive State regulations. The prohibition against the use of dredges--an efficient method of harvesting oysters--in a tricounty area in one State, is the result of a desire to make the resource available to all fishermen wanting to participate. Another Gulf State prohibits the use of more than one dredge, per boat, of a size no greater than 36 inches across the mouth to discourage exploitation by oystermen.

On the Atlantic coast, although no limits are placed on the amount of gear in public oyster areas, States generally regulate the type of gear that can be used. For example, patent tongs and oyster dredges are prohibited in most public areas in one State. In another State, this gear is allowed in many public areas, but daily catch

quotas are in effect and dredge size is limited. Dredges have to operate under sail power, except for 2 days a week when motor power is allowed. According to State officials, this is done in order to enhance oyster resources, maintain employment opportunities and a traditional culture for large numbers of people, and minimize conflicts among users of the resource. In contrast, regulation of private growing areas involves relatively few restrictions.

Clams

Improvements are possible in the harvesting efficiency of hard clams, but gear restrictions are a limiting factor. Two leading hard clam States limit harvesting to hand implements and do not permit the use of power dredges.

Development and use of innovative gear and techniques needed

Tuna

A major problem in fishing for yellowfin tuna is the continued use of purse seining, which causes the incidental catch and killing of porpoises. The killing of porpoises without a permit is in violation of the Marine Mammal Protection Act of 1972 (16 U.S.C. 1361).

On May 11, 1976, a U.S. Federal judge ordered that purse seining for tuna be stopped. We were told that the potential impact of this order is not known, but if allowed to stand will lower the domestic yellowfin harvest.

A bill (H.R. 13865) designed to overturn the judge's order was introduced on May 18, 1976, but not acted on by the 94th Congress. The circuit court of appeals stayed the judge's order until January 1, 1977.

Shrimp

There is a need for a shrimp separator trawl because of the discard problem. NMFS estimates that the gulf shrimp fleet discards upwards of 2 billion pounds of fish. Considerable time is spent in manually separating the shrimp from the fish to be discarded. A separator trawl would prohibit the entry or allow the escape of finfish while trawling. This would reduce the culling effort and provide for the conservation of those fish that would ordinarily be discarded. A project to develop a separator trawl was about 50 percent complete in early 1976. NMFS personnel feel that the design

goal of 90 percent separation of discards, while limiting shrimp losses to 10 percent, can and will be met.

The use of electric shrimp trawls could increase catch per unit of effort and provide a harvesting capability at times when shrimp are burrowed into the bottom. Although electric trawls are currently available, fishermen are not using them because the required conductive tow cable now available is more expensive than conventional cable. The loss of an electric trawl would cost the fisherman $3,000 to $4,000 versus $1,000 for a conventional trawl.

A recent innovation in Atlantic shrimp harvesting has been the introduction of metal traps. Use of traps increases the potential for harvesting shrimp in rocky areas inaccessible to trawls.

Another innovation is the use of twin trawling techniques--towing two trawls on a single pair of otter doors. Advantages include increased fishing efficiency, ease of handling, slower towing of nets, and sharper vessel turning with fewer incidents of tangling.

Salmon

Although harvest capability is adequate, Washington State Fisheries officials believe that at least 250,000 chinook males are now wasted which could be harvested. Restrictive regulation has prevented progressive development of selective fishing gear to take advantage of this opportunity.

Clams

Clam harvesting techniques need to be improved. For example, surf clam dredges must periodically be lowered to the bottom, towed and than raised to obtain the catch. Equipment that would continuously lift clams from the dredge to the deck would save time in comparison with present operations. Prototypes of equipment to do this have already demonstrated that the principle is workable. One industry official stated that it may not be adopted because it would require more than the normal two- or three-man crew and may not be economically practical.

PROCESSING AND PRODUCT DEVELOPMENT

Processing improvements needed

In several of the fisheries, processing improvements are needed. In the oyster fishery an automated shucker capable of processing raw oyster products is needed. Several automated shuckers have been developed to do this but none have been commercially successful. Development has been hindered by the wide variations in oyster size and shape. New methods could constitute a processing breakthrough for this industry.

Mechanization of the crab picking process offers an opportunity for growth of the crab fishery. Most crabmeat is currently picked by hand. At times when crabs are most abundant, processors have to limit crab purchases to their capacity to pick crabmeat manually. When this occurs on the Atlantic and gulf coasts, sometimes crabbers are asked to stop crabbing or the catch is shipped out of the area. Some processors have experimented with mechanical processing equipment. Most processors, however, have relatively small operations, and with the large fluctuations in the supply of the resource, they are reluctant to make research and devlopment investments. NMFS is testing crab picking machines and have found in preliminary studies that use of pressure rollers to squeeze out crabmeat looks promising.

By way of contrast, there have been a number of advances in the techniques of shrimp processing. Freezing technology improvements led to new shrimp product development and expanded the potential market for shrimp. Mechanical shrimp peelers greatly reduced the need for expensive manual labor.

Groundfish meat yields can be increased by using flesh separating machines to remove flesh from filleted fish carcasses. A study of productivity in the processing industry estimated that yields could increase from 30 to about 50 percent by the use of flesh separating machines. Although machines are available and are used extensively by foreign processors, most Atlantic groundfish processors do not use them. The limited use of these machines is related to the low price of the product produced, lack of volume production by domestic processors, and strong competition from imports.

Innovations in product development needed

There have been very few breakthroughs in product development in recent years. The last significant developments were the introduction of fish sticks and portions, and improvements in the freezing of shrimp.

Oyster product development, for example, has proceeded at a rather slow pace and most oyster production continues to be sold to the consumer in a fresh shucked form. Product forms meeting the convenience needs of consumers and restaurants and having long shelf life appear to have the highest potential success for development. NMFS researchers have developed several new product forms. According to NMFS officials, even more product forms could be developed. Processors stated, however, that they were undergoing a cost-price squeeze which prevented the accumulation of capital needed to invest in product development and the new processing techniques that would be required.

QUALITY OF FRESH FISH AND PROCESSED PRODUCTS

In some fisheries, the quality of fresh fish and processed products was regarded as a problem. There was concern that:

--In the gulf, the perishability of the oyster and its unfamiliarity to persons outside coastal areas are fundamental reasons for the decline in oyster per capita consumption.

--Because herring spoil rapidly after being caught, the fleet is restricted to harvesting in the inshore areas where it would not be more than 4 or 5 hours from port; an NMFS sponsored test showed that herring transferred from a catching vessel to a carrier vessel using a chilled seawater storage system could be held aboard ship long enough to enable U.S. fishermen to land herring from offshore areas in good quality.

--Because of the relatively short refrigerated shelf life of fresh picked crabmeat, further processing by freezing, pasteurizing, or canning is required if the meat is to be stored for later sale.

According to Pacific coast crab processors, the lack of proper handling and storage education or training by wholesalers and retailers has resulted in crab products

being marketed at less than their best condition. Crab processors stated that wholesalers and retailers are not insuring that frozen crab products are kept frozen until purchased, because once the crab has been allowed to thaw, it is often refrozen, resulting in an inferior product. The processors felt that if properly maintained products reached the consumer, product demand whould increase, particularly in the areas of the United States where the total crab consumption is from frozen products.

Because fish are highly perishable and spoil rapidly, proper handling and preservation methods must be employed from the time they are harvested through the entire marketing process. NMFS officials expressed concern that:

--Fish handling techniques onboard ship are inadequate when compared to the techniques available and being used aboard foreign vessels.

--There is no incentive for U.S. fishermen to land high quality fish because generally they are paid the same for poor quality as for high quality fish.

--Merchandisers have to improve their methods of handling and displaying fish.

Some foreign nations have emphasized the importance of maintaining high quality fish products. For example, Iceland established a system many years ago whereby its fishing industry provided financial incentives to its members to land and process high quality fish. The industry pays more for good quality fish than poor quality fish. Iceland's role is to inspect fish products and certify their quality. According to one NMFS official, this system has been highly effective because Iceland is known for the high quality of its fish products. One of the largest U.S. fast food corporations imports the bulk of its fish for its fish fillet sandwiches from Iceland.

MARKETING AND DISTRIBUTION

An NMFS planning document expressed the following general concerns on the marketing and distribution of fish.

--Distribution and marketing of seafood is often too slow, inefficient and costly.

--Complete information on supply of fish is not available to buyers and sellers.

--In the short run, industry is continually faced with a series of supply shortages or gluts.

--Insufficient information is known about the mechanisms of fishery marketing.

Marketing and distribution concerns on individual species include:

1. Atlantic groundfish--Reduced abundance of the most highly favored species and high transportation costs to inland markets has limited the expansion of fresh fish markets. Lack of information on product distribution channels and wholesale prices were also cited as problems.

2. Pacific groundfish--Capacity to fish is available, but markets for the fish do not exist.

3. Herring--Domestic markets will take a long time to develop. Foreign markets, however, provide a substantial opportunity for expansion.

4. Oysters--Due, in part, to the large number of small processors, industry promotion of its product is done only on a relatively small scale. Some State agencies have helped with oyster promotional campaigns, but in total, State and industry officials believe that oyster promotion has been insufficient. These officials expressed concern that many young adults are not eating fresh oysters and, as a result, market demand may be declining.

5. Shrimp--Some South Atlantic States could benefit by identifying and utilizing alternative markets, and improving existing markets.

6. Clams--Major obstacle for market development is the adverse effect that paralytic shellfish poisoning has on the fishery. When a ban on harvesting is put into effect, public confidence declines and sales drop significantly in affected areas.

JURISDICTIONAL ACTIONS TAKEN BY FOREIGN COUNTRIES

The actions of foreign governments to control fishery resources in their waters would have serious impacts on some U.S. fisheries. The gulf shrimp and California based tuna fisheries would be adversely affected because these

fisheries harvest substantial portions of their catches in foreign waters.

With respect to the shrimp fishery, a large number of U.S. vessels fishing off foreign shores could be forced into U.S. waters. This may not be offset by the exit of Mexican and Cuban vessels fishing in U.S. waters because of the U.S. extended jurisdiction policy. The size of the U.S. shrimp fleet may far exceed that needed to harvest the stock available to U.S. shrimpers.

As for the tuna fishery, industry, Inter-American Tropical Tuna Commission and NMFS officials believe the establishment by foreign nations of fishery conservation zones will eventually force U.S. fishermen out of many of their traditional fishing grounds and lessen the domestic tuna catch. An industry consultant reported that if foreign nations license U.S. vessels to fish within their conservation zones, the fee could add $100,000 to $200,000 per year in operating costs for each purse seiner. An industry representative informed us that some countries may require that up to 75 percent of their nationals be employed as crew members on U.S. vessels. Public Law 94-265 includes provisions designed to insure equitable access of U.S. fishermen to foreign waters. Industry and Inter-American Tropical Tuna Commission officials do not believe the sactions provided in the act will minimize the negative impact upon the industry.

On the Atlantic coast, there exists a potential jurisdictional problem related to control of the Northeast portion of Georges Bank; affected are the scallop, herring, and Atlantic groundfish fisheries. Establishments of boundaries based on equidistant lines between the Canadian and U.S. coasts would result in Canadian control of this area. U.S. officials contend that Georges Bank is an extension of the U.S. continental shelf and, therefore, should be under U.S. control. Because the disputed area is a major spawning ground for herring and groundfish, joint United States and Canadian management will be needed for effective management of the resource. Also, because very productive scallop grounds are located in the disputed area, many U.S. fishermen consider it important to their financial stability.

Idle capacity occurred in the spiny lobster fishery when the Bahamas declared the spiny lobster a creature of their continental shelf and began enforcing a fishing ban on the shelf, as of August 1, 1975. Negotiations have been held with the Bahamian Government to regain access for U.S. fishermen to Bahamian waters but they have been unsuccessful. As a result, about 800 U.S. fishermen who worked the Bahamian

shelf are unemployed and 250 U.S. based vessels are idle. It has been estimated that if these fishermen move into the Florida waters, spiny lobster catch per unit of effort would drop 28 percent due to the increased pressure on the stock. At the time of our study, about 50 vessels were working the shelf areas of Guatamala, Honduras, and Nicaragua. Their position is tenuous, however, because the countries could exercise jurisdictional prerogatives at any time and force these fishermen to leave.

Areas historically fished by U.S. snapper/grouper fishermen are diminishing as the Bahamas, Mexico, and Caribbean nations extend or enforce their fisheries jurisdiction.

FOREIGN COMPETITION

Since the 1960s, foreign nations have fished in traditional U.S. fishing grounds in ever-growing numbers and with increasing intensity. Not only do foreign fishermen compete with U.S. fishermen for available resources, but more importantly, their massive fishing efforts have contributed to the depletion of a number of stocks of fish, including some of the more valuable species to U.S. fishermen.

The ineffectiveness of international fishery agreements in preventing or terminating the overfishing of certain stocks of fish was one of the factors which led to passage of Public Law 94-265. The act prohibits foreign fishing (1) in the fishery conservation zone without authorization, (2) for anadromous species spawned in the United States, and (3) for U.S. continental shelf fish resources unless such fishing is authorized by an international fishery agreement. Each foreign fishing vessel authorized to fish must have a permit and fish in accordance with the conditions and restrictions of such permit.

Competition from imported fish products was identified as a problem. For example, the future growth and development of the Pacific coast oyster industry may be jeopardized by Korean imports, which increased 60 percent from 1972 to 1973. The current bilateral fishing agreement with the Republic of Korea allows importation of canned, smoked, steamed, boiled, and frozen oysters. Fresh shucked and live oysters are not permitted because of a shellfish disease. When the shellfish disease problem is resolved, the Republic of Korea might be allowed to export fresh, shucked, and live oysters to the United States. According to an NMFS official, Pacific coast oystermen may not be able to compete with these low priced imports.

For the blue crab fishery, competition from canned and frozen crabmeat imported from Japan and Taiwan is a major problem. Also, some of the minced crab imported from Japan is competitive with certain blue crab products.

Although the exvessel price of scallops has been relatively high, reduced overall resource abundance and strong foreign competition limit opportunities for increasing the size of the fleet.

COSTS ASSOCIATED WITH HARVESTING OPERATIONS

Vessels

According to an NMFS planning document, U.S. fishing vessels cost up to 30 percent more than foreign-built vessels. At the present time, U.S. fishermen do not have the option to purchase vessels from U.S. or foreign shipyards because, pursuant to a 1793 law, they cannot register foreign-built vessels in the United States. Another law (46 U.S.C. 251) provides that only enrolled U.S. vessels are entitled to the privileges of vessels employed in fisheries. As a result, if fishermen want to land fish in U.S. ports, it must be in U.S.-built vessels.

For the tuna, shrimp and menhaden fisheries, U.S.-built vessels are the best in the world and, therefore, it is unlikely that foreign-built vessels would be purchased by U.S. citizens if the law restricting them from doing so were repealed. There are, however, other fisheries where vessel replacements might be warranted. Most of the vessels in the Atlantic herring fishery are old and inefficient compared to the relatively modern Canadian fleet. Although some modern vessels have entered the Atlantic groundfish fishery in recent years, NMFS officials stated that the bulk of the fleet remains old and poorly maintained. An industry official, however, believes that most vessels have been well maintained but that due to increasing maintenance costs, as vessels become older, many are approaching the age when they need to be replaced because continued maintenance will no longer be economically practical. A 1973 study conducted for NMFS of the snapper/grouper fishery evaluated the fleet as generally old and in need of upgrading. One factor which might tend to discourage vessel owners from replacing these vessels is the high cost of U.S.-built vessels, compared to foreign-built vessels.

The rate of vessel replacement in all fisheries is affected by the high interest rate borrowers must pay which is compounded by a short payback loan period. A

NMFS representative cited 12 percent interest rates with payback periods of 5 to 7 years on vessels with expected lives of 15 to 20 years. With a short payback period, one bad fishing year could result in bankruptcy for the fisherman who took out the loan.

Nets and netting

A NMFS planning document states that the import duty on nets and the netting used in making nets can run as high as 50 percent. This tends to discourage U.S. vessel owners from using foreign nets and netting, and contributes to keeping the cost of domestic nets at a high level.

If the duty on foreign nets and netting were eliminated, fishing costs could be cut by 3 to 4 percent because nets and netting can run as high as 8 percent of a fishing vessel's operating expenses.

Insurance

Insurance studies have classified fishing as one of the most hazardous occupations. Statistics presented in an NMFS planning document indicate that the cost of insurance (hull and protection and indemnity) averages 5 to 7 percent of the total cost, excluding depreciation, of operating fishing vessels. A reduction of 30 to 50 percent in insurance costs could mean an overall reduction in vessel operating costs of about 2 percent.

According to this planning document, it is becoming increasingly difficult to obtain insurance at any price because there are few domestic insurers. Several of the reasons for this are

--unsafe vessels and operating conditions cause a high rate of accidents and

--the generous jury verdicts and broad court interpretations of section 20 of the Merchant Marine Act of 1970, as amended--known as the Jones Act--(46 U.S.C. 688), which holds vessel owners liable for all injuries to crewmen.

LABOR SUPPLY

In several fisheries, concern was expressed regarding the adequacy of the labor supply.

The crab fishery is experiencing labor supply problems because many members of the available labor supply seek other types of employment, welfare, or unemployment compensation as alternatives to picking crabs. In part, this is due to the poor working conditions in crab-processing plants. Also, with smaller crabs to process, pickers have to work very hard to earn substantially more than the minimum wage. Fluctuations in the supply of crabs, seasonally and from year to year, affects the stability of employment and adds to the problem.

Low wages and seasonal employment in the shrimp fishery result in a shortage of labor. In addition, frequent personnel changes decrease the operating efficiency of a crew.

Processing labor is also in short supply in the Atlantic and gulf oyster fisheries. This is particularly the case, according to processors, during periods when demand and supplies are at high levels. They explained that many persons do not want to shuck oysters because wages are relatively low, employment is seasonal, and the work is laborious and often messy. They also believe that competition from other types of jobs, welfare, and unemployment compensation limits the number of people willing to shuck oysters. On the Pacific Coast, oyster processing is also labor intensive.

With respect to the gulf snapper-grouper fishery, we were told that the average age of fishermen is 55 years. The incentive for crews is low because of the poor state of the vessels which are often out of service. As a result, catch levels, shares, and crew quality are the lowest among the gulf fisheries; good captains are hard to find; some captains want to make only a limited number of trips per year because of taxes; and crews do not like to stay out more than 7 days at a time.

FRAGMENTED NATURE OF THE INDUSTRY

The fishing industry is highly fragmented. Fishermen consist, for the most part, of small independent fishing vessel operators, more than 90 percent of which employ less than five people. In 1974, for example, 169,000 full- and part-time fishermen operated 14,507 vessels of 5 net tons or over and 71,365 boats of less than 5 net tons.

The fish processing and distribution components likewise consist principally of small establishments. In 1974 the 1,738 processing plants in the United States employed about 61,000 persons, or an average of about 35 persons a plant, and 1,796 wholesale establishments employed about 9,600 persons, or an average of just over 5 persons each.

The National Commission on Productivity, in its report on productivity in the fishing industry, pointed out that the fragmented nature of the industry leaves little opportunity for capital accumulation, and, therefore, even if reasonable chance for a fair return did exist, few members of the industry could make the investments necessary to develop new fisheries from underutilized species. Fragmentation also makes it difficult to achieve coordination among industry members.

CHAPTER 10

ECONOMIC ANALYSIS

At our request, NMFS, in September 1976, prepared an internal staff report on the U.S. commercial fishing industry's role in the national economy. This chapter is based on the material contained in that report.

MARKET SHARES OF DOMESTIC LANDINGS AND IMPORTS

In the United States, landings of seafood have not kept pace with population growth. Landings for edible food have stabilized around 2.4 billion pounds since 1960. An important consequence is that as the demand for fish has increased, U.S. landings have supplied a declining share of the market supply. Only a small amount of fishery products imported into the United States originates in catches taken within 200 miles of the U.S. coast, and this has been primarily from Canada. European countries, such as Iceland, Norway and Denmark, which do not fish off the United States, are major sources of imports as are Japanese catches taken in other parts of the world.

The market share between supplies of edible seafood products accounted for by domestic commercial fishery landings and imports has undergone significant change in the past two decades. Imports have represented an expanding portion of supplies of edible seafood products. Domestic landings of edible fish, which contributed 59 percent of total supplies in 1960, decreased to 38 percent in 1975. On the other hand, domestic landings of industrial fish, which supplied 62 percent of the market in 1960, decreased sharply until 1969. However, in 1975 domestic landings were supplying 64 percent.

The growth of imports relative to U.S. commercial landings, to a large extent, is indicative of the American consumer's preference for high-valued species of edible fish. For example, the U.S. consumption accounted for about 90 percent of American and spiny lobster landings, 40 percent of tuna landings, and 25 percent of shrimp landings. The U.S. appetite for high-valued seafood products has been principally responsible for the marked increase in the U.S. seafood trade deficit. The 1960 deficit of $285,000 steadily worsened to more than $1 billion in 1975.

FISH IN THE FOOD BUDGET

In the United States, fisheries products compete with other food products. Over the years, there has been a gradual change in the relative importance of fish compared to other items in the food budget. Since 1960 food expenditures as a share of disposable income have gradually declined from 19.6 percent to 15.8 percent in 1974. Most commodity group items in the food budget have followed this downward trend. One exception is fish. Expenditures on fish items as a percentage of disposable income increased from .48 percent to .78 percent during the 1960-74 period. When translated into actual dollars, expenditures at the retail level grew from $1.7 to $7.4 billion.

Within the food budget there has been a shift in the composition of expenditures on major commodities. Expenditures on meat, which traditionally account for the largest share, have fluctuated between 27 and 31 percent. Outlays for poultry dropped to slightly more than 3 percent of the food budget in 1974 and the percentage shares accounted for by dairy and eggs have fallen. Expenditures on fish as a percentage of the food budget, however, increased from 2.5 percent in 1960 to 4.9 percent in 1974. During the 1960-74 period total food expenditures more than doubled, while outlays for fish quadrupled.

In many U.S. markets a significant growth has taken place in sales of frozen seafood products, such as fish sticks and portions. Sales of frozen seafoods, which accounted for 14 percent of the total value of all frozen foods in 1964, increased to almost 20 percent in 1974. In other words, 20 cents of each dollar of frozen food sales was spent on seafood items. During the period 1964-74 the average annual growth trend for all frozen foods was 8.47 percent, frozen seafoods was 12.75 percent, and all other frozen foods was 8.03 percent.

NATIONAL IMPACTS

In 1973 the estimated national economic impacts from domestic commercial fishery activities were $6.7 billion in value added, $5.9 billion in earnings, and 486,000 man-years of employments. These impacts were distributed among sectors of the industry as follows: 30 percent in harvesting, 30 percent in processing, 35 percent in the wholesale and retail trade, and 5 percent attributed to transportation. The value added in the fishing industry accounted for .5 percent of the gross national product.

Fishing, processing, and wholesaling directly provide .3 percent of total employment in the civilian labor force and 7 percent of the labor force in the fisheries and agricultural sectors. Although the fishing industry is one of the smaller sectors of the economy, the labor force of 240,000 exceeds other important sectors, such as metal mining (86,000), coal mining (160,000), nonmetallic minerals (117,000), household appliances (197,000), electric wiring and lighting equipment (227,000), plastics, materials and synthetics (224,000), and dairy products (202,000).

REGIONAL IMPACTS

In certain regions of the country, fishing is much more significant then indicated in the national picture.

In Alaska, for example, employment related directly to fisheries accounted for 19 percent of employment and 7 percent of the gross state product. Taking into account indirect plus income effects which this basic industry has on the rest of the economy, fisheries-related activities contributed approximately 23 percent of employment and 12 percent of the gross state product.

At the county level the importance of the fishing industry becomes even more apparent. In Alaska, fisheries-related employment as a percentage of total employment ranges from 3.4 percent in Kenai-Cook Inlet County to 30.7 percent in Kodiak County. Certain counties in Maryland, Texas, Virginia, and Washington also rely heavily on the fishing industry for income and employment. (See table on p. 109.) However, the direct and indirect impact of the fishing industry on the local economies are not readily available. The economic condition of counties with significant fisheries-related employment, with some exceptions, tends to be below the rest of the State when measured on the basis of per capita income. For example, 28 of the 34 counties fall into this category. Moreover, 18 of these counties can be considered as having relatively "weak" economies (per capita income is less than 90 percent of the State).

1973 Economic Condition of Counties with Significant Fisheries-Related Employment (note a)

County	Total personal income (millions)	Per capita personal income	Fisheries-related employment as a percent of total county employment
Alaska	$ 1,958	$5,926	
Cordova-McCarthy	14	7,135	14.9
Kenai-Cook Inlet	73	5,109	3.4
Ketchikan	69	6,592	7.1
Kodiak	53	6,399	30.7
Outer Ketchikan	9	5,482	15.7
Wrangel-Petersburg	33	6,171	12.9
California	113,746	5,508	
Del Norte	73	4,881	1.6
Florida	37,799	4,880	
Monroe	240	4,729	1.5
Nassau	89	3,643	1.2
Georgia	20,928	4,343	
Glynn	229	4,386	8.5
Mcintosh	20	2,385	5.5
Maine	4,196	4,040	
Hancock	149	3,973	5.6
Knox	120	3,877	7.7
Washington	97	3,046	9.0
Maryland	22,185	5,446	
Queen Anne's	93	4,791	3.2
Somerset	77	4,095	10.5
Dorchester	137	4,648	3.4
Talbot	141	5,645	4.8
Massachusetts	30,551	5,268	
Bristol	2,045	4,451	1.3
Essex	3,380	5,228	1.0
New Jersey	43,026	5,874	
Cape May	330	4,944	2.3
Cumberland	606	4,673	1.5
North Carolina	22,577	4,258	
Dare	32	3,981	2.9
Oregon	10,753	4,845	
Clatsop	137	4,734	9.4
Lincoln	113	4,159	1.2
Texas	53,912	4,558	
Aransas	40	3,920	9.6
Cameron	472	2,970	6.9
Matagorda	114	4,147	1.4
San Patricia	177	3,515	4.4
Virginia	23,579	4,868	
Accomock	113	3,793	3.6
Lancaster	40	4,265	13.9
Mathews	29	3,791	11.9
Hampton City	570	4,449	1.3
Washington	17,674	5,151	
Pacific	75	4,687	10.9

a/Fisheries-related employment is considered significant when it is greater than or equal to 1 percent of total employment.

A contributory factor to the weak economic condition for many of these counties is that incomes of workers in the fishing industry tend to be below national averages for industries in the nondurable goods wholesale trade. The average annual pay per worker for seafood establishments in the wholesale trade was $6,400 in 1972; the national average for wholesale nondurable goods was $8,300. This figure varied by region, but the income level for the worker in a seafood establishment was always below the regional average. In the Middle Atlantic region, the average annual pay per worker in a wholesale seafood establishment was $8,900 compared to the regional average of $9,300. In the South, the average annual pay was $4,500 in the seafood sector, which was only 65 percent of the regional average. The same holds true for the Pacific region where the average for the region was $9,400 and for the wholesale seafood trade was $8,500.

A similar situation exists for workers involved with producing canned and cured seafood products. While regional figures are not available, aggregated figures for the food and kindred products industry at the national level shows that average income was $7,800 compared to $5,500 in the seafood sector.

FISHERIES DEVELOPMENT PROSPECTS

New opportunities

Public Law 94-265 offers opportunities for increasing U.S. catches of fish and reversing the declining trend in U.S. fishermen's participation in the domestic market which is expected to continue strong and probably will expand.

For U.S. fleets to take advantage of the opportunities, a substantial expansion program will be necessary. For example, restoration of the U.S. fleets' 50-percent market share by 1985 would require more than a $400 million investment in new vessels, and possible nearly $800 million for processing plant expansion. Additionally, nearly $400 million would be needed to replace vessels that are scrapped or, otherwise lost to the fleet. Action on the part of both the private and public sector will be necessary to expand U.S. production facilities in line with opportunities for expansion presented by Public Law 94-265.

National economic benefits from fishing

Benefits can accrue to the national economy from a significant expansion of the U.S. seafoods industry and a lessening of the dependence upon imports. For example,

nationally, each added $1 million in U.S. fleet landings translates into 113 jobs, 33 directly in fishing and 80 in supporting industries. This means that 48,000 jobs would be created if increased landings restored U.S. fleet market share to one-half, based on added revenues of about $425 million (in 1973 dollars). Imports under these conditions would be reduced by more than $400 million, while U.S. exports of fishery products would increase by more than $100 million. This would result in a substantial improvement in the chronic deficit position in the U.S. balance of trade for fishery products. Economic impacts associated with different levels of landings are shown in the following table.

	Baseline forecast	U.S. fleet market share 32%	50%	67%
Quantity (million pounds, round-weight):				
Domestic landings	2,696	3,120	4,773	8,528
Imports	6,889	6,495	4,842	4,098
Total supplies	9,585	9,615	9,615	12,626
U.S. consumption	9,285	9,285	9,285	9,285
Exports	300	330	330	3,341
Value (million dollars, 1973):				
Domestic landings	1,166	1,254	1,590	2,316
Value of increased landings	-	88	424	1,150
Employment gains:				
Direct	-	2,881	13,892	37,618
Direct and indirect	-	7,059	34,035	92,166
Direct, indirect, and induced	-	9,940	47,927	129,784

Investment climate

In GAO's opinion, the expansion of the U.S. fishing fleet should be financed by private capital. If the growth in the fishing industries creates substantial public benefits and private capital is not or cannot be made available to finance the expansion, consideration should be given to Federal participation.

Following are several benefits which may attract investment in the fishing industry:

--Improved cash flow and ability to accumulate capital.

--A changing attitude toward and a greater willingness to seek the business of the seafood industry by the private financial community.

--Increases in productivity which can lessen the spiraling cost of fishery products for consumers.

--Larger supply and greater variety of products for consumers.

--Opportunities for improving quality and consumer safety of fisheries products.

--Opportunities for increased exports.

It is true that there has been little expansion in recent years, and some sectors of the industry suffer from obsolescence. Nonetheless, the core for expansion is there, and the new climate for investment that can follow from extended jurisdication can induce growth.

CHAPTER 11

CONCLUSIONS AND PROPOSED SOLUTIONS

Although the fishing industry's contribution to the Nation's gross national product and food supply is small when compared with other industries, it is an important industry because it provides

--direct employment to 240,000 persons in harvesting, wholesaling, and processing;

--indirect employment to a large number of persons in supporting businesses and industries; and

--the American consumer with a nutritious source of food and an alternative to other types of protein.

In addition, the Nation's fishery resources are a valuable national asset because of their potential to further contribute to the economy and food supply.

Actions taken in the past by State and Federal governments and members of the fishing industry have not been successful in overcoming the plight facing the industry. Accordingly, measures need to be taken to revitalize it.

PLIGHT OF THE INDUSTRY

With almost one-fifth of the world's marine fishery resources located off U.S. coasts, it might be expected that our fishing industry would naturally be strong and prosperous. This is not the case. Landings of fish have not kept pace with U.S. population growth. Annual landings of edible fish (about 2.4 billion pounds) have remained relatively constant since 1960. As the demand for fish has increased, U.S. landings have supplied a declining share of the market supply. Consequently, imports of edible species have jumped sharply and now represent 62 percent of the total supply of edible fish products.

Certain segments of the U.S. harvesting industry are in a chronically depressed state. Some of our important species have been depleted or are threatened with depletion. In some instances domestic fishermen have crowded into the high-value fisheries. As a result, there are more fishermen and gear than can be used efficiently in

these fisheries. In contrast, too little fishing has been directed to species which, though underutilized by our fishermen, are taken in large quantities by foreign fishermen.

It is interesting to note that the fishing industries in foreign nations are in a state of change and uncertainty. Our international analysis shows that foreign fisheries also have too much harvesting capability and that fishery resources are being overfished.

The reasons for the depleted condition of many of our valuable fisheries resources and the lack of increased production are numerous and their interrelationships complex. Fishing is essentially a hunting activity rather than a cultivating activity. Access to the resources has been open to everyone, including massive foreign fleets fishing as close as 12 miles off U. S. shores. The use of efficient gear, in many cases, is prohibited or restricted. Jurisdiction is fragmented. Stocks fluctuate widely, due to natural or man-induced changes to the environment. The industry deals with a highly perishable product and is characterized by many small operating units and high operating costs for gear, vessels, and insurance; for some fisheries, there is strong competition from foreign nations subsidizing their fishing operations. Fishing is a high risk and sometimes even dangerous operation.

We believe that opportunities exist to strengthen the industry through increasing the harvest of fish by

--restoring the stocks through effective management and enhancement of the environment,

--expanding aquaculture,

--developing underutilized species, and

--displacing foreign fishing off the U.S. coast.

In 1974 foreign fishermen harvested substantial quantities of fish (2.8 million metric tons) within 200 miles of the U.S. coast. With the advent of extended fisheries jurisdiction provided by Public Law 94-265, U.S. fishermen will have a preferential right to harvest fish formerly caught by foreign nations. However, because certain species are overfished, it might be necessary in the short run to restrict the U.S. harvest for these species to maximize long-run production opportunities. It is possible that such restrictions will result in lower catch by U.S. fishermen of certain species or even a moratorium until the stocks are restored to a level to assure their perpetuation.

In addition to increasing the harvest, opportunities exist to strengthen certain fisheries by increasing the efficiency of harvesting operations and overcoming barriers in processing, marketing, and distributing fish and fish products. We present information which Government officials and industry representatives may wish to consider on opportunities for and obstacles to growth and development of species now important or potentially important to the U.S. fishing industry. (See app. III.)

To strengthen and expand the industry, actions need to be taken in the following major issues:

--Common property.

--Fragmented jurisdiction.

--Lack of precise data.

--Environmental problems.

--Fragmented industry.

--Jurisdictional actions taken by foreign countries.

--Costs associated with harvesting operations.

--Development of underutilized species.

The characteristics and problems that make our fisheries unique are interrelated in such a way that piecemeal solutions to surface problems or symptoms of distress are not likely to succeed.

COMMON PROPERTY

Fish are a common property resource because anyone desiring to fish, can. In some instances, this has attracted more fishermen, vessels, and gear than the resource can sustain and has led to overfishing. In addition, total harvesting costs increase and overall efficiency decreases because the increased number of fishermen often results in a reduced catch for each participant of the fishery. To conserve the resource, States have enacted regulations which generally give little consideration to the economic efficiency of the participants in a fishery. Some regulations, for example, restrict the use of certain efficient harvesting techniques and gear. As the economic viability of fishermen is impaired, it becomes more difficult to

obtain financing at reasonable rates of interest and with reasonable loan payback periods.

The common property concept deters private investment necessary to develop underutilized species. Without ownership or control of the resource, investors could not expect to realize more than a small portion of economic benefits generated by developing a fishery.

In our veiw, the solution to deal with the problems caused by common property is to limit fishing effort which would help management to conserve the resource while increasing the efficiency of fishermen, improve expected rate of return on investments, and encourage the development of underutilized species.

Alternatives to accomplish this might include

--limiting the number of licenses to be issued,

--establishing fees based on volume or value of fish landed,

--establishing quotas on the volume of fish landed,

--establishing a program to buy back those vessels made idle as a result of actions taken by Government entities to reduce fishing effort as an inducement to reduce the number of vessels in overcrowded fisheries and for possible resale of the vessels for use in other fisheries, and/or

--combining two or more of the above.

It must be recognized that limiting commercial fishing will result in social and economic problems for those fishermen who are displaced. Some of these problems could be overcome by providing employment retraining assistance to displaced fishermen so they may move into new jobs. In adopting any limiting system, the interests of both commercial and recreational fishermen when they compete for the same resource must be considered.

Although there are various alternatives to correct the common property problem, the important fact to recognize is that fishing must be controlled. Even if it is controlled, some participants will be economically inefficient and may not prosper and, in fact, may eventually go out of business. The difference, however, is that the failure of a business operation has not been caused by inefficiencies imposed by a governmental body.

Public Law 94-265 provides regional fishery management councils with authority to establish limited access schemes in management plans which, if implemented, could be effective in controlling fishing.

FRAGMENTED JURISDICTION

Fisheries management is difficult when only one government entity is involved but becomes more difficult when several government entities are involved, particularly when States, cities, towns, and counties desire to protect local interests and political concerns.

Public Law 94-265 provides a framework for overcoming the adverse effects of fragmented jurisdiction by assigning the responsibility to manage species harvested predominantly outside the territorial sea to regional fishery management councils and the Secretary of Commerce. However, as discussed in chapter 8, many species are harvested predominantly within the territorial sea and to that extent will remain under State jurisdiction. This appears to be a basic shortcoming in Public Law 94-265, because certain important species which span or migrate between State boundaries or beyond the territorial sea might be excluded from comprehensive and coordinated management--a must if resource availability is to be sustained.

Management of fisheries under State jurisdiction will continue to be subject to the adverse effects of fragmented jurisdiction unless some provision is made to coordinate and/or centralize management. The State-Federal Fisheries Management Program, a voluntary effort on the part of States and NMFS, provided a mechanism to resolve problems created by inconsistent State laws but progress has been slow.

We believe that Public Law 94-265 could be amended to expand the Government's authority to include species, harvested predominantly in territorial waters, which span or migrate extensively between State boundaries or beyond the territorial sea and for which States have not voluntarily implemented effective management plans within a reasonable period of time.

LACK OF PRECISE DATA

Obtaining the data necessary for fishery management is a complex process. Biological, social, and economic data is needed to make fishery management decisions.

Although some knowledge exists on the condition of stocks and the interdependence of various species, in most cases, scientific proof of fishery conditions has not been available. As a result, fisheries managers have been reluctant to make hard management decisions. Additionally, there is often a lack of social and economic data necessary to measure the probable effect of a given management decision on the fisheries' participants and local economy.

We recognize that, since fishery resources are dynamic in nature, complete data will be extremely difficult to obtain. Yet, effort will have to be put forth in this area if effective management is to become a reality.

Public Law 94-265 takes a major step in this direction. It requires the regional fishery management councils to establish and maintain scientific and statistical committees to assist in developing, collecting, and evaluating data. It also requires the Secretary of Commerce to initiate and maintain a comprehensive program of fisheries research. We cannot prejudge the adequacy and effectiveness of these future efforts. To some degree, this will be contingent on the amount of available resources and effort expended.

The Federal Government could take the initiative to insure close cooperation with States, universities, and industry necessary to develop the techniques required to collect and analyze data on the relationships between fishery resources and their environment and the socioeconomic effects of the manner in which they are utilized.

In negotiating with foreign countries wishing to fish in the U.S. 200-mile economic zone, the Federal Government should require the foreign countries to cooperate in developing, collecting, and evaluating scientific and statistical data.

ENVIRONMENTAL PROBLEMS

Because fish are an environmentally sensitive resource, the pollution of marine waters can affect their very existence--by reducing their ability to reproduce or destroying them outright and rendering them unsafe for human consumption. Altering or destroying coastal and estuarine areas can also adversely affect our Nation's fisheries because many species depend on these areas during their lifespan.

The several Federal laws concerned with environmental quality are steps in the right direction to solving environmental problems. We believe that enforcement of the

laws and close coordination and cooperation of participating Federal, State, interstate, and local agencies are essential to alleviate environmental problems. Additional or expanded research should be conducted where needed to minimize the short and long term effects of pollution.

FRAGMENTED INDUSTRY

The fishing industry is highly fragmented. Fishermen consist, for the most part, of small independent fishing vessel operators, more than 90 percent of which employ less than five people. The fish processing and distribution components likewise consist principally of small establishments.

The fragmented nature of the industry leaves little opportunity for capital accumulation and makes achieving coordination among various operators to develop fisheries extremely difficult. Industrywide cooperation toward exploiting development opportunities could help overcome existing barriers. A possible solution to alleviate the problems caused by fragmentation is through expanded use by industry of cooperatives and joint ventures. The Government should explore the Federal assistance (e.g., technical, financial, etc.) needed by the industry on a short term or temporary basis to create an environment in which industry could operate with little or no Federal assistance. We believe that existing authority available under the various programs of Federal organizations, such as Small Business Administration and National Marine Fisheries Service should be utilized to the extent that they can meet these needs.

JURISDICTIONAL ACTIONS TAKEN BY FOREIGN COUNTRIES

The actions that have been or might be taken by foreign governments to extend jurisdiction over their fishery resources have had or will have adverse effects on certain segments of the U.S. fishing industry. The shrimp and tuna fisheries, for example, would be adversely affected unless the foreign nations extending their jurisdictional authority permit U.S. vessels to fish in their waters. The spiny lobster fishery has already experienced difficulties because the Bahamian Government declared the spiny lobster a creature of its continental shelf and excluded U.S. fishermen from fishing this resource in its waters.

Further, there exists a potential jurisdictional problem as to control of the northeast portion of Georges Bank. Establishment of boundaries, based on equidistant lines between

the Canadian and U.S. coasts, could result in Canadian control of this area, thus possibly adversely affecting U.S. scallop, Atlantic herring, and Atlantic groundfish fisheries.

Because the U.S. fishing industry cannot control the actions of foreign governments and yet suffers the consequences of those actions, the Government should assist the industry. If foreign governments take actions adversely affecting the U.S. fishing industry, the Government should, as authorized by Public Law 94-265,

--enter into reciprocity agreements with foreign countries fishing in the U.S. 200-mile zone,

--deny foreign governments the right of access to U.S. waters for fishing purposes, and

--impose import prohibitions on fish and fish products of the foreign governments concerned.

Should this prove to be unsuccessful, the Government might consider the following solutions:

--Encouraging displaced fishermen to transfer to domestic fisheries having growth potential and to fully use existing Government programs for financial and technical assistance needed.

--Providing employment-retraining assistance to displaced fishermen so they may move into new jobs.

--Establishing a program to buy back idle vessels of displaced fishermen.

COSTS ASSOCIATED WITH HARVESTING OPERATIONS

The fishing industry is subject to high costs for vessel, nets and netting, and insurance. Additionally, the terms of loans to fishermen usually include high interest rates and short loan repayment periods which may cause cash flow problems for vessel owners; one or two poor fishing seasons could have disastrous financial effects on a fisherman.

Possible solutions to reducing harvesting costs include:

--Removing the restriction on the use of foreign-built vessels to land fish in domestic ports. We believe that this must be weighed against the effect such action might have on the domestic shipbuilding industry and national interests.

--Exploring possibilities to lower interest rates and extend loan repayment periods. We believe this should be a joint effort by Government, fishermen, and banks to ascertain what options are possible and how they can be implemented.

--Lowering the tariffs on nets and netting material.

--Exploring possibilities to lower insurance rates.

With respect to financial assistance programs, our analysis of foreign assistance programs showed that financial aid can result in excess capacity. Consequently, expanded Federal programs for financial aid should be closely coordinated with fisheries management to prevent financing unnecessary effort.

DEVELOPMENT OF UNDERUTILIZED SPECIES

Some fish resources available to the U.S. fishing industry are considerably greater than amounts presently harvested by U.S. and foreign fishermen. Underutilized species, such as croaker, mullet, and anchovy, are not fished to any great extent by domestic or foreign fishermen. Species, such as Pacific hake and pollock, while fished intensely by foreign nations, are underutilized by domestic fishermen. Although underutilized fish resources off the U.S. coasts provide a large potential for expanding domestic fisheries, before most of the species can be brought into commercial production, various barriers to their use must be overcome.

The fragmented structure of the industry and the common property concept limits the availability of capital for fisheries development. Development programs, in addition to dealing with these problems, would have to overcome such barriers as resource assessment, harvesting technology, handling and transportation, product development, processing technology, and marketing and economic analysis.

Public Law 94-265 encourages developing fisheries which are currently underutilized or not utilized by U.S. fishermen. What must be decided is the approach to be followed and amount of effort to be expended.

We believe that the most effective means to accomplish this objective are through joint Federal- and industry-sponsored development projects directed at overcoming major barriers applicable to a specific underutilized species or related group of species.

There are several advantages to using a piecemeal approach.

1. Because of limiting the scope, the effort is more manageable and, therefore, the opportunity for success is greater.

2. Resources can be directed in a concentrated and coordinated fashion.

3. The problems, and hence the solutions, affecting one species may be different from other species.

4. Cost-benefit relationships can be measured.

5. Results may be realilzed in a relatively short period of time.

In our opinion, to induce industry participation, the Federal Government could

--develop a management program to conserve the resource after the fishery has been developed;

--establish property rights, such as a guaranteed share of the annual quota for fishermen who pioneer the development of underutilized resources; and

--encourge the use of existing Federal financial assistance programs now available to fishermen and processors where private capital is not available. The financial programs should be utilized to the extent that they can meet the needs of fishermen and processors.

OTHER AREAS WHERE FEDERAL INVOLVEMENT MIGHT BE WARRANTED

In addition to those already discussed, there are barriers to the expansion and viability of certain established fisheries. These barriers relate to

--harvesting techniques and gear,

--processing methods and product development,

--product quality,

--marketing and distribution,

--foreign competition, and

--labor availability.

We believe that some Federal assistance is warranted if the viability and expansion of the industry is to be maintained and promoted. For example, the Federal Government could undertake research and development programs to deal with various technological problems. Before undertaking an assistance program, if any, a congressional and/or Administration policy decision should be made as to the amount of Federal effort and resources to be applied.

The Congress and/or the Administration will have to determine whether Federal assistance should be furnished to the industry where

--benefits accrue to a single firm as opposed to the fishing industry in total or major segments of the industry, or

--a project is too costly in terms of the benefits to be derived, or

--a problem is common to many industries and Government assistance is not being furnished to other industries.

U.S. House of Representatives
Committee on
Merchant Marine and Fisheries
Room 1334, Longworth House Office Building
Washington, D.C. 20515

November 19, 1975

The Honorable Elmer B. Staats
Comptroller General
General Accounting Office
441 "G" Street, N.W.
Washington, D.C. 20548

Dear Mr. Staats:

For some time, we and other Members of our Full Committee and especially of our Subcommittee on Fisheries and Wildlife Conservation and the Environment have been concerned with the plight of the U.S. fishing industry and believe we must seriously consider what measures might be taken to revitalize the industry.

The GAO Report entitled "The U.S. Fishing Industry Can be Strengthened by Developing Underutilized Fish Resources" (May 1975) points out that ". . . the development of the vast underutilized fish resources into commercially viable fisheries . . . ." would have numerous benefits. The supply of fish products available to the consumer would be increased, our reliance on imported fish would be decreased, exports would be increased, and new fisheries would be provided as alternatives for those fishermen involved in fisheries where excess harvesting capacity now exists.

The GAO Report entitled "Need to Establish Priorities and Criteria for Managing Assistance Programs for U.S. Fishing Vessel Operators"(February 1973) recommended redirection of certain financial assistance programs administered by the Department of Commerce toward modernizing segments of the U.S. fishing fleet to enable it to compete effectively with foreign fleets.

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Spurred by a sense of urgency to control the increased foreign fishing in waters off the United States, Congress is now likely to enact some form of extended fisheries jurisdiction by late 1975 or early 1976. The advent of extended jurisdiction presents new opportunities for development of the domestic fishing industry. It calls for a reassessment of the Government's role in assisting industry to take advantage of the potential presented and assure optimum utilization of our resources in the national interest.

As enunciated in Senate Concurrent Resolution 11 (1973), ". . . it is the policy of the Congress that our fishing industry be afforded all support necessary to have it strengthened, and all steps be taken to provide adequate protection for our coastal fisheries against excessive foreign fishing."

In response to recommendations of the National Advisory Committee on Oceans and Atmosphere in both 1972 and 1973, NOAA's National Marine Fisheries Service is finalizing a National Plan for Marine Fisheries which considers problems, issues, and possibilities for action and which sets broad goals for all interested entities in designing the future of the marine fisheries of the United States. That plan considers only in general terms the role of Government in expanding and developing the utilization of available fishery resources to provide a strong competitive U.S. fishing industry.

Other involved agencies are also addressing alternatives for management and allocation of fisheries resources in the extended jurisdiction zone. For example, the Congress' Office of Technology Assessment is presently engaged (at the request of this Committee, the Senate Commerce Committee, and the Senate National Ocean Policy Study) in an ambitious examination of present and future impacts of technology in U.S. fisheries, with special consideration of implications of an extended fisheries jurisdiction.

It is apparent from all these sources that ample opportunities do exist for strengthening the American fishing industry, but they remain to be translated into specific requirements for future industry and Government action. We are, therefore, requesting that GAO undertake

a study to delineate policy issues, options, and costs of revitalizing the U.S. commercial fishing industry However, the study should not include aquaculture as this will be the subject of separate consideration by the Committee. We intend to use your study in formulating comprehensive legislation for development and utilization of our fish and shellfish resources and in formulating a National Fisheries Policy. We want the GAO study to serve two broad functions:

1. Provide an objective analysis of a number of areas where present programs may be inadequate or non-cost-effective, or where additional programs are needed. For example, deficiencies in the following areas might constitute limiting factors or "weak links" contributing to present difficulties in the industry:

a. adequacy of the biological knowledge base and fisheries research efforts to improve it;

b. adequacy of present fisheries regulations and management -- both for assuring wise conservation and use of the resource and for assuring an industry structure which permits a fair and equitable rate of return on investment of participating fishermen;

c. education and manpower -- the adequacy of the work force to provide the necessary skills now and in the future which can support a modern, competitive fishing industry in the United States;

d. adequacy of available statistical, economic, and market analysis data and the industry and Government capabilities for providing needed information of these kinds in a timely fashion;

e. adequacy and cost-effectiveness of financial assistance programs available to various segments of the fishing industry.

2. Clarify the roles of Government and of the private sector in the structure and functioning of the various sectors of what we collectively refer to as the American fishing industry. We are interested both in the present separation of responsibilities and roles as well as in clear indications of where new or additional Federal

involvement is necessary or desirable if the revitalization of the industry is to occur quickly and efficiently.

To assist you in designing your study to serve the two broad functions just enumerated, we offer these following questions as examples of our information needs and concerns. They are intended only to further convey the sense of what we need to know, and not to constitute a list of itemized contractual obligations from GAO in this study.

-- What national benefits accrue from a strong American fishing industry? What is the industry's contribution to the national and regional economies? To the national food supply?

-- Where do opportunities lie for effective restoration and growth of the American fishing industry? What resources are available geographically and within what industry sectors?

-- How will the areas [supra] for potential growth and development be affected by extended jurisdiction? What areas were not affected?

-- What obstacles inhibit industry growth and development? What are the present institutional barriers to industry growth (e.g., regulations, labor, etc.)? Technology lag?

-- Can the U.S. harvesting sector compete with foreign interests even with extended jurisdiction? What is the impact of foreign subsidized fisheries on the competitive position of the U.S. industry? What is the impact of Government subsidies of selected food commodities on the competitive position of fish products in the marketplace? What type of financial assistance, if any, should the Government provide to strengthen the competitive position of fish products?

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-- What forms of assistance to the industry might be justified? What is the Government role in processing and marketing of seafood? Is the present industry structured to effectively do more on its own? For example, should it do more marketing and processing and/or research and development? If so, how might this work be financed?

-- What can Government do to stimulate greater leadership in the American fishing industry, either cooperatively or independently, that will result in a stronger and more competitive position in World fisheries? What Government programs can be considered to strengthen the U.S. fishing industry? If possible, identify the costs and benefits of such Government programs.

To the extent possible, the assessments you make and the findings you reach should be formulated in your report so that various Government and industry actions necessary to strengthen the U.S. fishing industry are considered; present Federal programs are evaluated for cost-effectiveness, necessary investment and operating costs of securing for our fishing industry a competitive position in U.S. and World markets are estimated, if possible (together with recommended sources of funding); and appropriate Federal roles in recommended programs of action are suggested. Please identify to the extent practicable whatever new or modified legislation you find is needed to accomplish the purpose of strengthening our domestic and distant water fisheries operations.

Finally, it is our desire and intent that your research and analyses not be unnecessarily duplicative of efforts past or present of the National Marine Fisheries Service, the Office of Technology Assessment or any others. The National Marine Fisheries Service has a great deal of information and personal expertise which is critical to the successful completion of this GAO study. Director Schoning has personally assured us of his readiness to provide data and data analyses in support of your work, and to cooperate with you however he can. Mention has already been made of the on-going OTA study and technology assessment. We suggest that you consult freely with both these agencies and through joint meetings, as you deem desirable and necessary, arrange for the sharing of information and assistance so as to avoid duplication and best prepare the report we

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seek. Because analysts in the Congressional Research Service of the Library of Congress are routinely involved in assisting this Committee and other Congressional Committees having interests in the area of marine fishing and the fishing industry, we also suggest you may wish to maintain liaison with the Congressional Research Service, as appropriate, during the course of your study. Since we recognize this is a broad and still somewhat loosely defined set of tasks, we know periodic meetings with us and our staff will be valuable in assuring continued agreement on this assessment and the character of your final product. We want to have your study results, if possible, no later than September 1, 1976.

It is recognized that the Great Lakes offers the potential for sustaining a substantial fishery. Accordingly, though it is generally understood that the initial thrust of your efforts will be in the saltwater regions, it should also be understood that as resources become available and before dispersement of your study team, a similar assessment of opportunities for revitalization of the Great Lakes commercial fisheries will be undertaken. The Great Lakes study, we agree, may be submitted independent of and subsequent to the target date for completion of the main study but, hopefully, no later than March 1, 1977.

Sincerely,

Leonor K. Sullivan, Chairman
Committee on Merchant Marine
and Fisheries

Philip E. Ruppe
Ranking Minority Member

Robert L. Leggett, Chairman
Subcommittee on Fisheries
and Wildlife Conservation
and the Environment

Edwin B. Forsythe
Ranking Minority
Subcommittee Member

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